
AN ANNOTATED INDEX
OF PLANT DISEASES
IN CANADA

I. L. COOPER

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AN ANNOTATED INDEX
OF PLANT DISEASES
IN CANADA
and fungi recorded on plants
in Alaska, Canada
and Greenland

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Research Branch
CANADA DEPARTMENT OF AGRICULTURE
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Introduction

The Annotated Index is a summary of the recorded occurrence of diseases of cultivated plants in Canada and of the fungi reported on plants, both wild and cultivated, in Canada, Alaska and Greenland. My prime purpose is to bring together the information published in the Canadian Plant Disease Survey and the Forest Insect and Disease Survey for easy reference by host and by province or territory, and to assess the importance of the most serious diseases. Reference is also made to contributions by Canadian workers to our knowledge of these diseases and their etiological agents.

A serious attempt has been made to adopt the names that our current knowledge led me to believe to be correct. For example, Hughes [479] has illustrated the true species of *Helminthosporium*. The only one that pathologists are likely to encounter is the silver scurf organism, *Helminthosporium solani* Dur. & Mont., formerly known as *Spondylocadium atrovirens* (Harz) Harz ex Sacc. (*Helminthosporium atrovirens* (Harz) Mason & Hughes [479]). The so-called graminicolous species of *Helminthosporium*, important pathogens of cereals and grasses, have been placed in the genera *Drechslera* Ito [992, 993] or *Bipolaris* Shoemaker [992]. In some groups, the development of new concepts and the process of revision are incomplete, as in the Thelephoraceae. The old names have usually been retained, but names under which the organisms may appear in recent European literature are given in square brackets after the name adopted in the Index. These alternate names are given only once, where the fungus is mentioned for the first time in the text. When the fungus is subsequently reported on other hosts, reference is made to the original citation; e.g., on *Abies* there is listed *Aleurodiscus minnsiae* Jackson [*Laeticorticium m.* (Jackson) Donk]; and when the fungus is reported on *Pinus*, there appears at the end of the entry: "see *Abies*." In the Polyporaceae, where the process of revision is even less advanced, the traditional names found in North American literature have been used except for a few segregate genera that have been studied by Dr. Mildred K. Nobles and her colleagues. Here the traditional names appear in synonymy.

A number of conventions not found in standard works have been adopted to save space and to facilitate ease of reference. The period has been omitted from the abbreviations of the names of provinces and territories of Canada and of the states of the U.S.A. The annual reports of the Canadian Plant Disease Survey are referred to by the year covered by the respective report, rather than the year they were published. However, in 1960, when the Survey became a quarterly, reference could only be made to the year of publication. As no separate report for 1924 was

published, the records for that year appearing in the summary prepared by Dr. F. L. Drayton for the years 1920-24, the record must be interpreted as applying to one or more years including 1924. However, this summary has frequently been cited rather than the four earlier reports, because it gives a useful summary of the observations on the most common diseases for these five years. As the annual reports of the Canadian Plant Disease Survey began with the year 1920, each citation consists of only the year in this century followed by a colon and the appropriate page of the report. For example, *Cercospora zebrina* reported on *Trifolium hybridum* in Manitoba in 1929 appears thus: on 5 Mar 29:79. Reports of the Forest Insect and Disease Survey, which were first published in 1951, are distinguished from the Plant Disease Survey by prefixing the letter F before the year. To distinguish clearly Survey citations from those from other sources, the latter are indicated by numbers in square brackets. For ease of reference to Arthur's Manual [15] and Fungi of Manitoba and Saskatchewan by Bisby et al. [93] the pages are also shown.

It must be stressed that this Index, in common with the other compilations, has certain distinct limitations. The pathogen may have been misdetermined or the host may have been misidentified. In some instances, especially where specimens have been cited, it has been possible to rectify errors. Except for the nematodes, the Annotated Index provides a definite record of the diseases reported in the Canadian Plant Disease Survey up to 1959. The same is true of the annual reports of the Forest Insect and Disease Survey. In most instances the earliest record for each province is given, but for some of the most common diseases, Dr. Drayton's summary was cited in preference. In compiling the records from the literature, the Canadian Journal of Botany and its predecessor, the Canadian Journal of Research, and Mycologia, vols. 28-47, were carefully reviewed. No such independent check was made of Scientific Agriculture, Canadian Journal of Agricultural Science and Canadian Journal of Plant Science, or Phytopathology although many papers from these journals are cited. Nor was a careful search made in other sources because only scattered references to fungi not treated in the summaries already cited would be encountered. The main exception was the inclusion of papers on arctic fungi published by Rostrup and Lind. No rigorous scrutiny of the English common names of the various plant diseases was attempted. They are usually those to be found in the Survey. The French names were obtained principally from "Noms français des maladies des plantes au Canada (avec equivalents anglais)." This valuable list [4a] was prepared by a nomenclature com-

mittee of the Quebec Society for the Protection of Plants, Mr. David Leblond, committee secretary.

Several notable summaries have been published in the last forty years. The only previous summary of plant diseases for the whole of Canada was prepared by Dr. F. L. Drayton, who summarized the observations in the Survey for the first five years, 1920-24. Crowell and Lavallée [231] prepared a "Check list of diseases of economic plants in Canada," which gives the distribution of each disease by province. Important regional summaries are: G. R. Bisby et al. [93], "The fungi of Manitoba and Saskatchewan"; L. E. Wehmeyer [1138], "The fungi of New Brunswick, Nova Scotia and Prince Edward Island"; J. A. Parmelee [828], "The fungi of Ontario. I. Uredinales"; Edith K. Cash [175], "A check list of Alaskan fungi"; and R. Sprague [1037], "Check list of the diseases of cereals and grasses in Alaska." W. Jones [535] published a useful "Check list of plant diseases of the coastal areas of British Columbia"; and A. M. Brown [144], "A check list of plant rusts in Canada." Toms [1087a] has recently published "Plant diseases of southern British Columbia, a host index." Finally, W. G. Ziller has permitted me to use his mimeographed lists [1198, 1199, 1203] of fungi of British Columbia deposited in the herbarium of the Forest Biology Laboratory, Victoria, B.C., as well as some typewritten notes [1207].

As the chief compiler and editor of the annual reports of the Survey from 1929 to 1956, I have been continually impressed by the dynamic, if not dramatic, changes in the predominant pathogens. Not only do fluctuations in temperature and rainfall influence the seasonal presence of important pathogens, but shifts in the cultivars and changes in agricultural practice bring about profound changes in the disease situation.

In a relatively virgin country such as Canada, where vast areas of the arable land have been brought under cultivation only in the last 150 years, new pathogens are continually making their appearance.

One of the earliest destructive diseases was late blight of potato, caused by *Phytophthora infestans*. According to Heald [431] late blight was epidemic in eastern North America in 1845. That the epidemic was severe in the area now known as Ontario is evident from contemporary sources. In the John C. Clark diary (unpublished MS) occurs this entry: "15 Nov. 1845. Great loss of potatoes by rot. Mr. Barrett has lost 900 bushels, Mr. Garrett 600, Mr. Scott 300 and every farmer more or less in proportion to the quantity planted." The observations were made near Bath, Ont. At the first annual meeting of the Provincial Agricultural Association for Upper Canada, on Oct. 22, 1846 in Toronto, Adam Ferguson, in his address, observed: "Heavy and annoying as these

partial evils [rust in wheat, etc.] are, how they do sink into comparative insignificance when brought into consideration with the awful and appalling visitation which has for the second consecutive season in Canada ravaged our potato crop." [J. Trans. Bd. Agr. Upper Canada 1:39. 1855]. From a sentence further along in the same paragraph, it is evident that the casual organism first announced by Montaigne in 1845 was as yet unrecognized in Canada, for Ferguson continues, "There is, undoubtedly, a very great degree of mystery attending this disease and all attempts at investigation have hitherto failed in producing any satisfactory results." Late blight, it may be reasonably assumed, has been present from Ontario eastward ever since 1845. Because the late blight organism depends closely on suitable rainfall and temperature for its development, the disease is destructive almost every year in the Maritime Provinces and coastal British Columbia, where the crop must be protected by an adequate spray program. On the other hand, late blight was unknown for many years in the Prairie Provinces and has there only rarely reached epidemic proportions.

Bunt or stinking smut was the most important disease of wheat [511] when, after 1880, wheat production rapidly increased in Manitoba and the adjacent prairies further west. Losses reached a peak about 1891, but fortunately seed treatment for the control of bunt was introduced and the practice spread rapidly. Nevertheless, bunt was not eliminated although the losses never again reached the high levels of those in the preceding century. With the introduction of Marquis and later cultivars that possessed considerable resistance to bunt, losses have declined still further. Part of this decline may be due to the somewhat later date at which the crop is sown as mechanization has permitted rapid sowing of the crop.

Heavy losses from smut infection in oats and barley were also recorded as early as 1894 [511]. Although treating the seed with formaldehyde controlled smut in oats and in some measure covered smut of barley, these smuts continued to cause loss of crop. Only with the introduction of smut-resistant cultivars of oats have losses from smut declined. Today in Manitoba where resistant cultivars are grown almost exclusively smut has disappeared from oats.

Sometimes a disease of considerable importance may long remain undetected because of its close resemblance to another well-known disease. A good example is dwarf bunt of winter wheat. The first specimen that came to my attention was a sample of winter wheat from Armstrong, BC, 31:5. Although it was recorded on the packet, DAOM 862, that "the spores have remarkable prominent nets," and my correspondent had noted that the infected heads were borne on culms, "which were considerably shorter than those

bearing healthy heads," the pathogen was identified as *T. caries*. Potter and Coons [858a] had reported the occurrence of a high and low smut in fields of winter wheat in Kent Co., Michigan, in July 1917, and drew attention to an earlier report of low smut by Harwood [420a]. However, these authors considered the causal organism of low smut to be *T. tritici* (*T. caries*). Without field experience, it was difficult to appreciate how this bunt in winter wheat differed from the bunt that I had seen in spring wheat caused by *T. caries*. Dwarf bunt of winter wheat continued to be confused with common bunt caused by *T. caries* until Young [1192a] reported in 1945 from Montana the occurrence of a new variety of *T. tritici* (*T. caries*) characterized by nearly all the bunted heads being borne on extremely dwarfed stems. In 1945, Tyler [1093a] announced the finding of dwarf bunt in western New York State. As one of the most popular cultivars of winter wheat in southern Ontario at this period was Cornell 595, it seemed probable that the disease was also present in this province. However, it was not until 1952 that dwarf bunt was finally recognized in Ontario. In that year Fischer [291a] described the dwarf bunt organism as a distinct species, *Tilletia brevifaciens*. He showed that, unlike *T. caries* and *T. foetida*, the spores of *T. brevifaciens* are surrounded by a gelatinous sheath, which is best demonstrated in mounts of spores in Shear's fluid.

In 1954, I [199] showed that *T. brevifaciens* was morphologically not distinct from *T. controversa* described by Kühn on *Agropyron repens* in 1874. In fact Liro [609, p. 351] presents evidence that the organism was known in 1794. After observing dwarf bunt in the field in 1953 and 1954, it seemed desirable to determine whether or not any early collections of this bunt on wheat might have been preserved in various herbaria under the names of *T. caries* or *T. tritici*, especially as the description of the field occurrence of low smut in Michigan given by Enos Holmes to Harwood [420a] agreed closely with my observations in Ontario. As a result of my search, samples of dwarf bunt were found, collected in 1892 in Michigan, in 1917 in Indiana, and about 1860 in Herkimer Co., New York State. Fischer and Duran [292a] have summarized these early records. The earliest specimen of dwarf bunt in wheat that they uncovered was collected in 1847 in Czechoslovakia. Thus, dwarf bunt of winter wheat, which was recognized to be caused by a distinct organism in 1952, had remained unrecognized for over a century. Today it is known that dwarf bunt may occur on many cereals and grasses, particularly in the tribe Hordeae.

The cereal rusts and their history, especially in Western Canada, are too well known to require more than brief mention. Johnson [571] has summarized this history in Western Canada from

1891, when rust was first reported, up to the severe rust epidemic in 1916, when some 100 million bushels of wheat were destroyed, and on to the present time. The epidemic in 1916 provided "a powerful stimulus for action against rust." Continued losses between 1916 and 1924 further stimulated action until a fully comprehensive program of research was initiated. By the development of rust-resistant cultivars the wheat growers of Manitoba and Saskatchewan have been protected for protracted periods from the worst ravages of rust. The first relatively rust-free period lasted from 1939 until 1949, when race 15-B of stem rust appeared and resulted in a severe rust epidemic in 1954. Since 1955 cultivars resistant to race 15-B have been available. Some excellent rust-resistant cultivars of oats were also developed; unfortunately when they were grown in close proximity to barberries in Eastern Canada, they rapidly became rusted by previously unrecognized races of stem rust. Just as man has, over the years, modified plants and animals by hybridization and selection, so "through his modifications of the host plants of cereal rusts, man is also modifying the rusts." [512].

The introduction of new raspberry cultivars has provided some of the most unexpected changes in the relative importance of specific pathogens. For instance, *Pucciniastrum americanum*, the late yellow rust, was known from a few collections on wild *Rubus*. With the introduction of Viking red raspberry into commercial production this rust became of economic importance in raspberry plantings, especially in the Maritime Provinces, where white spruce, the alternate host, is used extensively in windbreaks. When Viking was introduced into such plantings not only was it severely rusted but other cultivars in the planting also became moderately rusted. *Sphaerotheca macularis*, the cause of powdery mildew of raspberry, is not uncommon on many raspberry cultivars, but when Latham became popular because of its winter hardiness, it proved very susceptible to powdery mildew.

Of the various causes of diseases in plants the fungi were the first to be recognized as plant pathogens. About a century ago de Bary established the fungus nature of the smuts and rusts. Early in the century bacterial plant pathogens were successfully demonstrated by Erwin F. Smith. When the Survey began in 1920, the virus nature of many important diseases of plants was being established and physiologic disorders caused by deficiency of minor elements were still largely unknown.

Probably on account of their economic importance, the first virus diseases to attract attention in Canada were peach yellows and little peach. The first recorded epidemic of peach yellows occurred in the Niagara Peninsula from 1878 to

1884 and both yellows and little peach from 1908 to 1913. Erwin F. Smith showed that yellows was readily transmitted by budding and that diseased trees were a menace to healthy trees in the same orchard. Losses were reduced by systematic inspection and prompt removal of affected trees. However, it was not until 1933 that Kunkel [574b] demonstrated that the plum leafhopper, *Macropsis trimaculata*, was the vector. Periodic epidemics continued until 1942 and since then these diseases have been rarely reported. Their rarity in the last two decades is not entirely unexpected as the insect vector has not been reported in recent years, probably because the modern insecticides used in the spray program are effective against leafhoppers. In the meantime, attention has been focused at St. Catharines, Ont., and Summerland, B.C., on other virus diseases affecting fruit trees.

The importance of virus diseases of potatoes was realized early in the century. Murphy [557] did excellent pioneer work in the Maritime Provinces, where a start was made in recognizing these diseases, in studying their spread and in determining means of reducing their incidence. In recent years these studies have been concentrated at Fredericton, N.B., with limited studies at Vancouver on potato virus diseases peculiar to British Columbia. MacLeod [661] has published a useful summary of the potato mosaic and streak virus diseases.

Mosaic and leaf roll were newly introduced diseases of raspberry when the Survey began in 1920. Virus diseases of *Rubus* were first studied at St. Catharines, Ont., and later in depth at Vancouver, B.C. [1048]. The virus diseases of strawberry have also been studied intensively in British Columbia [725].

The virus diseases of cereals were the last group to command attention. Wheat streak mosaic was recognized to occur in Canada in 1952 and Slykhuis [1017] found that the virus was transmitted by the mite *Aceria tulipae*. Although barley stripe mosaic was first recognized as a distinct disease (false stripe) in 1924 in Manitoba, it was 1952 before Hagborg [397] presented evidence of its virus nature.

Some of the most serious physiologic disorders are due to the lack of boron. Drought spot and corky core were already causing severe economic losses to the apple crop in the B.C. interior by 1922. The cause remained undetermined until Atkinson [21] in New Zealand demonstrated that it was caused by a deficiency of boron. In 1936 it was found that treating the soil with small amounts of boron rapidly corrected the deficiency with a consequent improvement in apple production. Lack of iron, magnesium, manganese and zinc have also been found in the B.C. interior; the lack of these elements in apple and other fruit trees has largely been corrected by appro-

priate foliar sprays. Brown heart or water core, particularly in swede turnip or rutabaga, has been corrected either by soil applications of boron or, where the soil has a high lime content, by foliar sprays [660a].

The list of physiologic disorders is extensive, but a few additional examples must suffice. Gray speck of oats, caused by a lack of available manganese, is an important disease in widely scattered areas in several provinces. Lack of magnesium in oats was a problem in N.B. until measures were taken to correct the condition. One of the most spectacular physiological diseases is whiptail in cauliflower, a crop very sensitive to molybdenum deficiency.

Deficiency or imbalance of the nutrient elements in the soil may predispose a crop to attack by pathogenic organisms. The outstanding example is browning root rot of wheat, caused by *Pythium* species, which was destructive in the 1930's until it was demonstrated that the disease could be corrected by phosphatic fertilizers [1102, 1105].

Increasingly, nematodes have come to be recognized as important plant pathogens. *Meloidogyne hapla* is the most common species in Canada associated with root-knot in plants. Also, the root-lesion nematode *Pratylenchus penetrans* was found to be the primary cause of the failure of young peach trees to become established in old peach-tree sites. On the other hand, the presence of this nematode in the roots of eggplant had little adverse effect on the growth of the plant. However, when *Verticillium dahliae*, a parasite to which eggplant is very susceptible, was introduced into nematode-infested soil, wilt was more severe than usual. A root-rot condition in strawberry known as black root appears to be caused by a variety of fungi, but recent work suggests that *P. penetrans* may be an important parasite in the root-rot complex [1088].

I am indebted to the late Dr. K. W. Neatby, former Director of Science Service, Canada Department of Agriculture, who approved the undertaking of this compilation. The Index was enlarged to cover fungi of forest trees at the urging of Dr. V. J. Nordin, Program Co-ordinator (Pathology), Canada Department of Forestry. Dr. C. Frankton and his colleagues gave valuable advice and guidance in the usage of the scientific names of the hosts and Dr. B. Boivin provided many of the French names in common use in Canada. I am also indebted to Dr. Luella K. Weresub for advice on scientific names in current use in the Thelephoraceae and to Dr. Mildred K. Nobles on those of the Polyporaceae.

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Canada Department of Agriculture
Ottawa, Ontario, Canada
May 14, 1965

Abies Mill.

PINACEAE

Evergreen, handsome trees of the temperate regions of the northern hemisphere and ranging south on the higher mountains.

1. *A. balsamea* (L.) Mill., balsam fir, sapin baumier; occurs widely from the Atlantic coast west and north to Alta and south to the New England and border states and on the mts to Va. An important source of pulp and lumber.
2. *A. amabilis* (Dougl.) Forb., amabilis fir, sapin gracieux; extends along the Pacific coast from BC into the US, but unknown in the Queen Charlotte Islands. Used for pulp and lumber.
3. *A. grandis* Lindl., grand fir, sapin grandissime; in Canada in BC in the southern coastal region and to a limited extent in the interior wet belt. Of no great commercial importance.
4. *A. lasiocarpa* (Hook.) Nutt., alpine fir, sapin concolore; on the interior plateau, at the lower elevations, of BC; in Alta and the Yukon and south in the US. A source of rough building material and mine timbers.

Other hosts: 5, *A. alba* Mill. 6, *A. concolor* (Gord. & Glend.) Lindl. 7, *A. pinsapo* Boiss.

Acanthonitschkea coloradensis Cash & Davidson: on bark of 4 BC [50].

Aleurodiscus abietis Jacks. & Lemke: on *A. sp.* BC, 1 Ont type, TRTC 13437, Que NS [599, p. 225].

A. amorphus (Pers. ex Fr.) Schroet.: canker, chancre aleurodisquéen: on 1 Ont 35:60, Que 34:72, NB NS PEI [1138]; on 1 Sask Ont Que NS, 3, 4 BC [599]; on 2 BC [1207]; on 3, 4, 7 BC [1198]. A weak parasite common on dead or living branches, particularly of suppressed trees.

A. canadensis Skolko: on 1 Que [599].

A. farlowii Burt: on *A. sp.* BC [1198].

A. laurentianus Jacks. & Lemke: on 1 Que [599, p. 251].

A. minnsiae Jackson [*Laeticorticium m.* (Jacks.) Donk]: on 4 BC [496, 1198].

A. penicillatus Burt: on 3 BC [599].

A. weirii Burt: on 3 BC [982].

Amphisphaeria incrustans Ell. & Ev.: on branches of 1 Man 31:109, [93, p. 52].

A. juniperi Tracy & Earle: on weathered wood of 1 and other conifers NS [1138].

Arceuthobium campylopodum Engelm.: on 2, 4 BC [570]; on 2 BC F59:109; on 4 from nearby *Larix occidentalis* BC F59:108.

A. douglasii Engelm.: on 3 BC [570].

Armillaria mellea (Vahl ex Fr.) Kummer: root rot, pourridié-agaric: on 1 Sask Man F52:94, 98, Ont 24:48, F52:69, Que [677], NB NS Nfld [241]; isolated from 2, 4 BC [1198], Alta F51:41; causes a white stringy rot in the roots and butt. Common in 1 in eastern N Am [58]; in 2 BC [149]; in mixed stands of 4 and *Pinus contorta* var. *latifolia* Alta F57:70.

Ascochyta abietis Naum. (*Godronia a.* (Naum.) Seav.; stat. conid. *Bothrodiscus pinicola*, q.v.): twig blight, brûlure des rameaux: on 1 Ont F60:66, [361], NS [1138] on 4 BC [1207].

Aspergillus ochraceus Wilhelm: isolated from seed of 1 Ont [374].

Asterodon ferruginosus Pat.: on 4 BC [1198].

Aureobasidium pullulans (de Bary) Arn. (*Pullularia p.* (de Bary) Berk.): from 1 NB F53:26.

Auricularia auricula (Hook.) Underw.: on *A. sp.* BC [87]; on 4 BC F59:92, [1198].

Bifusella abietis Dearn.: on 4 Alta F62:101, [cf. 236].

B. faullii Darker: needle blight, rouge: on 1 Ont type, Que NS [236, p. 19], Que 39:97, NB F55:25, NS [1138], PEI 40:86. An unimportant pathogen of immature trees, F56:37, F57:30.

Bothrodiscus pinicola Shear: on 1 Man [93, p. 38], NB F55:26, NS, associated with the perfect state *Ascochyta abietis* [1138].

Botryosphaeria abietina (Prill. & Delacr.) Arx: on 1 Que [53].

Caeoma faullianum Hunter: on 4 Alta [1202]. From a restudy of the type collection the host was found to be *Pseudotsuga menziesii* (q.v.) infected with *Melampsora albertensis* [1204].

Caldesia viridis (Alb. & Schw.) Pat.: on old bark of 1 Man [93, p. 79].

Caliciopsis pseudotsugae Fitzp.: on 3 BC [318, 1207].

Calocera viscosa Fr.: on wood of 1 and other conifers NS [1138].

Cenangium abietis (Pers.) Rehm.: twig blight, brûlure des rameaux; on 1 Sask F54:98.

Ceratocystis bruneocrinita Wright & Cain: on sapwood and bark shreds of 1 Ont Que [1169, p. 1218].

Chaetomium globosum Kze.: from seed of 1 Ont [1009].

Ciboria rufofusca (Weberb.) Sacc.: on 2 BC [1198].

Cladosporium herbarum Lk.: on 4 Yukon [1207].

Coniophora olivacea (Fr.) Karst.: common on decayed 1 Man [93, p. 75].

C. puteana (Schum. ex Fr.) Karst.: brown cubical rot, carie brune cubique: on 1 Man F51:141, Ont F51:130, F52:69, Que F56:36; from 1 NB NS Nfld [241], Nfld F53:21; from 4 BC F52:150. Fairly common cause of butt rot; for cultural characters see Nobles [791].

C. suffocata (Pk.) Massee: on wood of 1 and other conifers NS [1138]; on 3 BC [1198].

Coniothyrium faullii Darker: on dead needles of 1 after attack by *Hypodermella mirabilis* (q.v.) Ont type; or after attack by *H. mirabilis* and *Bifusella faullii* (q.v.) Que [240, p. 1008].

Conoplea geniculata (Cda.) Hughes: on 1 Ont [480].

Cordana pauciseptata Preuss: from wood of 1 NB NS [480].

Coriollus heteromorphus (Fr.) Bond. & Singer (*Trametes heteromorpha* (Fr.) Bres.): isolated from spores of sporophore on 1 Que [795], Labr [943]; from 4 BC [1198]; see also Nobles [791].

C. sepium (Berk.) Murr. (*Trametes s.* Berk.): on 1 NB [1138].

C. serialis (Fr.) Murr. (*Trametes s.* Fr.): from 4 BC [1198].

C. variiformis (Pk.) Sarkar (*Trametes v.* (Pk.) Pk.): on and from 4 BC [943, 1198]; see also Nobles [791].

Corticium albo-ochraceum Bres.: on 1 NB [1138].

C. bicolor Pk.: on very decayed 1 Man [93, p. 75]; on 4 BC [1198].

C. centrifugum (Lév.) Bres. [*Athelia epiphylla* Pers.]: on 4 BC [1198].

C. corrugae (Burt) Burt: on 4 BC [1198].

C. furfuraceum Bres. (*C. calceum* Fr. sensu Burt): on wood of 1 NS [1138].

Abies

- Corticium galactinum* (Fr.) Burt [*Scytinostroma g.* (Fr.) Donk]: white stringy rot, carie blanche filandreuse: on 1 Man [93, p. 76], from decay Ont Que [1160], NB 29:94, NB NS Nfld [241]; on 3 BC [1160]; on 4 BC [1198]; very common cause of butt rot but rare in trunks of 1 in eastern N Am [58].
- C. hydnans* (Schw.) Burt (a ?smooth form of *Radulum orbiculare* Fr., q.v.): on bark of 1 NS [1138].
- C. laeve* Pers. ex Fr.: from 4 BC [1198]; in Europe usually as *C. evolvens* (Fr.) Fr.
- C. lividum* (Pers. ex Fr.) Fr. [*Phlebia livida* (Pers. ex Fr.) Bres.]: on 1 NS [1138].
- C. macounii* Burt: on 4 BC [1198].
- C. odoratum* (Fr.) Bourd. & Galz. [*Scytinostroma o.* (Fr.) Donk]: on *A. sp.* Ont [1160].
- C. pelliculare* Karst. [*Athelia pellicularis* (Karst.) Donk]: on 1 Man [93, p. 76]; on 4 BC [1198].
- C. pini-canadensis* (Schw.) Jacks. & Rogers (*Peniophora piceina* Overh.): on old wood and bark of 1 Man [93, p. 78].
- C. radiosum* Fr. [*Gloeocystidiellum citrinum* (Pers.) Donk or *G. r.* (Fr.) Boid.]: on 1 NB F53:24; on 4 BC [1198].
- C. proseocremeum* Bres. [*Hyphoderma r.* (Bres.) Donk]: on 1 NS [1138].
- C. separatum* Jacks. & Dearden: on 3 type, BC [499, p. 154].
- C. sulfureo-isabellinum* Litsch. [*Gloeocystidiellum s.* (Litsch.) Boid.]: on 1 Ont Que [494]; on 4 BC [1198].
- C. sulphureum* (Pers. ex Fr.) Fr. (*Hypochnus fumosus* Fr. [*Phlebiella vaga* (Fr.) Karst.]): on fallen 1 Man [93, p. 77]; on 2 BC [1198].
- Coryne sarcoides* (Jacq. ex Fr.) Tul.: on 3 BC [1207] from 4 BC [1198].
- Crepidotus herbarum* Pk.: on 1 NB [1138].
- C. sphaerosporus* (Pat.) Singer: on 4 BC [1198].
- Cryptospora pini* Desm.: on 1 NS F61:42.
- Cytospora abietis* Sacc. and *C. friesii* Sacc.: associated with canker and dieback of 1 Ont F58:58.
- Dacrymyces minor* Pk.: on decorticated wood of 1 NS [1138].
- D. palmatus* (Schw.) Bres.: on 3 BC [1203].
- Darlucula filum* (Biv.-Bern.) Cast.: on *Uredinopsis pteridis* on 3 BC F60:109.
- Dasyscyphus agassizii* (Berk. & Curt.) Sacc. (*Lachnella a.* (Berk. & Curt.) Seav.): on 1 Man [93, p. 39], Que 39:97, Ont NB NS Labr Nfld [89]; on 2, 3 BC [1198]; on 4 BC [1207]; common on 1 [979].
- D. aridus* (Phill.) Sacc.: on 4 BC [1198].
- D. calyciformis* (Willd.) Rehm: on 6 PEI [1138].
- D. resinarius* (Cke. & Phill.) Rehm [*Trichocyphella resinaria* (Cke. & Phill.) Dennis]: canker, chancre dasyscyphéen: on 1 Ont F51:133.
- D. turbinulatus* (Schw.) Sacc.: on 4 BC [1198].
- Dermea balsamea* (Pk.) Seav. (stat. conid. *Gelatinosporium abietinum* Pk.): on 1 Que 32:103, Ont Que NS [370, p. 377]; associated with canker and dieback Ont F58:58; both states often associated [1138].
- Dimerosporium abietis* Dearn. [*Dimeriella balsamicola* (Pk.) Petr.]: sooty mold, fumagine: on foliage of 2 BC [1203]; of 3 BC [1198]; of 4 BC [50]; occasionally common, 41:81, [cf. 293]. An asterinaceous fungus was also present on 2 BC, DAOM 49166 [293].
- Diplodina parasitica* (Horst.) Prill.: on 1 PEI 25:62, [1138].
- Ditiola radicata* Fr.: on 1 NS [1138].
- "Echinodontium tinctorium* Ell. & Ev." (*Fomes tinctorius* Ell. & Ev.): on 2 BC F51:149; on 3 BC [1207]; on 4 BC Alta F52:131, 149. A very important decay organism of *A. spp.* in BC [87]; for cultural characters see Nobles [791]. Causes a brown stringy heartrot of conifers.
- Eriosphaeria vermicularia* (Fr.) Sacc.: on fallen 1 Que [53].
- Flammula alnicola* (Fr.) Kummer (*F. connissans* sensu Ricken non (Fr.) Gill. [258]): yellow rot, carie jaune: from 2 BC F58:102, [1203]; from 4 BC [1207]; recorded from 1 in Canada [258].
- Fomes annosus* (Fr.) Karst.: fomes root rot, maladie du rond: frequent cause of decay of 2 BC [149]; on 2, from 3 BC [1198]; causes a root and butt rot [87].
- F. nigrolimitatus* (Rom.) Egel.: on 4 BC [1198].
- F. officinalis* (Vill. ex Fr.) Neuman: on 2 BC [1198]; on 3 BC F57:86, [1199].
- F. pini* (Brot. ex Fr.) Karst. (*F. pini* (Thore ex Pers.) Lloyd, *Trametes p.* Thore ex Pers.): red ring rot, carie blanche alvéolaire: cause of decay of 1 Sask 28:94, Ont Que rare 24:47, [677], NB NS Nfld F53:20; of 2 BC F51:149; of 3 BC [1198]; of 4 BC F53:152, Alta F51:141; on 1 NS [1138]; on 2, 3 BC 33:84; on 4 BC Yukon [1207]; rare but widely distributed cause of pocket trunk rot of 1 in eastern N Am [58].
- F. pinicola* (Sw. ex Fr.) Cke.: brown cubical rot, carie brune cubique: on 1 Alta F59:92, Sask Man [93, p. 71]; from insect-killed trees Ont F51:130; from 1 Que [677]; from 2 BC [149]; from 4 BC F52:149. Infrequent as a trunk rot but cause of sap rot and decay of dead trees in eastern N Am [58]. Biology of the species was studied by Mounce [740].
- Isolates of this heterothallic and bipolar species were shown to fall into three groups. Group A, a large one, contained isolates from *Abies*, *Picea*, *Pinus*, *Pseudotsuga*, *Tsuga*, *Betula*, *Populus* and *Prunus* in Canada from BC Alta Sask Man Ont and in Alaska; these isolates were fully compatible with each other but almost completely incompatible with group B. The latter, a smaller group, contained isolates from *Picea*, *Tsuga* and *Populus* in Canada from BC Sask Man Ont and in Alaska. Group C contained isolates of European and Japanese origin from *Picea*, *Pinus*, *Betula* and *Salix* that were almost completely compatible with group A and only partially incompatible with group B. In group B were several isolates of the so-called populus or hardwood form of *F. pinicola*, at times designated as *F. marginatus* (Fr.) Gill. [746].
- F. robustus* Karst. (*F. hartigii* (Allesch. & Schnabl) Sacc. & Trav.): uncommon cause of decay in 2 BC [149]; recorded on 4 BC [1198].
- F. roseus* (Alb. & Schw. ex Fr.) Karst.: brown cubical rot, carie brune cubique: uncommon on 1 NB F53:24, [1138].
- F. subroseus* (Weir) Overh.: on wood of 1 and other conifers Man [93, p. 81]; on 1 NB F53:24, NS [1138]; heterothallic and bipolar [745]; regarded by Lowe and Gilbertson [618] as *F. cajanderi* Karst.
- Fusicoccum abietinum* (Hartig) Prill. & Del. (*Phoma abietina* Hartig): red flag, chancre des rameaux: on 1 NS F58:27, common in central NB 56:118, F54:24, F56:25; recorded on 3 BC [982]; in this instance flagging was not caused by *Valsa friesii* (q.v.), F56:24 [but see Faull, 285].
- Ganoderma applanatum* (Pers. ex Wallr.) Pat. (*Fomes applanatus* (Pers. ex Wallr.) Gill.): cause of a white mottled rot of broad-leaved, or, rarely, coniferous trees; on 1 Que [791]; occasionally on 2 BC [149]; for culture studies see Nobles [791].

- Ganoderma lucidum* (Leyss. ex Fr.) Karst.: on 1 NB 50:113.
- G. oregonense* Murr.: causes a soft spongy white rot of western conifers; on 3 BC [791, 1198]; for culture studies see Nobles [791].
- G. tsugae* Murr.: on 1 NB F53:24.
- Gleocystidiellum lividocoeruleum* (Karst.) Donk (*Aleurodiscus lividocoeruleus* (Karst.) Lemke): on 1 Ont [599].
- Glonium stellatum* Muhl. in Fr.: on 1 Man [93, p. 43].
- Grandinia granulosa* Fr.: on 4 BC [1198].
- Graphis scripta* (L.) Ach.: on bark of 1 NS [1138].
- Helotium ?pallidescens* (Pers.) Fr.: on 1 NS [1138].
- Hericium abietis* (Weir ex Hubert) K. Harrison (*Hydnum abietis* Hubert ex Engelerth nom. nud.): major cause of decay of 2 BC [149]; on 2, 3 BC [1198].
- Herpotrichia nigra* Hartig: brown felt blight, feutrage brun: on 1 Que 33:103; on 2 BC heavy F54:131; on 4 BC [1198], Alta F51:143.
- Hyalopsora aspidiotus* (Magn.) Magn. (*Peridermium pycnoconspicuum* Bell): needle rust, rouille des aiguilles: 0 I on 1 Ont 24:48, Que [15, p. 10], NS [1138]; on 2, 3, 4 BC [1198]; [cf. 828].
- Hymenochaete badioferruginea* (Mont.) Lév. (a ?form of *H. tabacina*): on 1 ?NS [1138].
- H. rubiginosa* (Dicks. ex Fr.) Lév.: on 4 BC [1198].
- H. tabacina* (Sow. ex Fr.) Lév.: on 4 BC [1198].
- H. tenuis* Pk.: on 1 Man [93, p. 77]; on 4 BC [1198].
- Hyphosoma lumbricoidea* (Dearn.) Hughes (*Helminthosporium abietis* W. B. Cke. & Shaw); sooty mold, fumagine: on 2, 4 BC F58:102, [1203]; associated with *Limacinia alaskensis*, presumably the conidial state.
- Hypoderma robustum* Tub.: needle cast, rouge: on old needles of 2 BC 41:81, [236].
- Hypodermella mirabilis* Darker: needle cast, rouge: on 1 Ont type, Que [236, p. 46]; associated with *H. nervata* (q.v.) on 1 Que F56:38; on 4 Mack F63:104.
- H. nervata* Darker: needle cast, rouge: on 1 Alta F63:104, Sask F52:96, Man F51:143, Ont 49:94, Que F55:37, NB Nfld F33:24, NS [1138], Ont type, Que NS [236, p. 51]; sometimes heavy in young stands.
- H. punctata* Darker: needle cast, rouge: one of the more important needle blight fungi in stands of immature 1 Que F57:30, [236].
- Kabatiella balsamea* (Davis) Arx (*Gloeosporium b. Davis*): on 1 NS F61:42.
- Kirschsteiniella thujina* (Pk.) Pomerleau & Etheridge (*Amphisphaeria t.* (Pk.) Sacc.): blue stain, bleuissure: in 1 Que F61:54, [855].
- Leccinum scabrum* (Bull. ex Fr.) S. F. Gray: on 4 BC [1199].
- Lenzites saepiaria* (Wulf. ex Fr.) Fr.: brown cubical rot, carie brune cubique: on 1 Sask Man 48:96, Ont F55:62, Que F57:30, NB NS [1138], Nfld F52:20; on 3 BC [1207]; on 4 BC F53:155; common on coniferous wood Sask Man [93, p. 82]. A heterothallic, bipolar species; complete interfertility of isolates from *Abies* with those from other conifers [744].
- Leptosphaeria faullii* Darker: on dead needles of 1 after attack by *Hypodermella mirabilis* Ont type, or by *H. mirabilis* and *Bifusella faullii* Que [240, p. 1006].
- Limacinia alaskensis* Sacc. & Scalia: sooty mold, fumagine: on 2 BC F55:106; on 3 BC [51, 1198].
- Lophium mytilinum* Fr.: on 1 Que [53], Nfld F53:25.
- Lophodermium* sp.: needle cast, rouge: on 4 Alta F53:131.
- L. autumnale* Darker: needle cast, rouge: on 1 Que type, Ont NS [236], NS [1138]; on 4 Alta F62:102.
- L. lacerum* Darker: needle cast, rouge: important needle blight fungus in stands of immature 1 Que F57:30; on 1 Ont type, Que [236, p. 80].
- L. piceae* (Fckl.) Höhn.: needle cast, rouge: on 1 ?Man [93, p. 43], Ont [236], Que F57:30.
- Lycoperdon perlatum* Pers.: on 4 BC [1198].
- Marasmius campanellus* (Pk.) Atk. & House: on dead twigs of 1 Man [93, p. 91].
- Melampsora abieti-capraearum* Tub. (*M. epiteae* Thüm.): needle rust, rouille des aiguilles: 0 I on 1 Alta F63:104, Sask [93, p. 63], NS 22:189, [1138]; on 3 BC [1198, 1202]; on 4 BC F53:155, BC Yukon [1207]; [cf. 828]; for description of mycelium and haustoria of this and other rusts on *Abies* see Hunter [487]; on 4 often mixed with *Pucciniastrum epilobii* (q.v.) [1202]; on 2 by inoculation [1202].
- Melampsorella caryophyllacearum* Schroet. (*M. elatina* Arth., *M. cerastii* Schroet., *Peridermium elatinum* (Alb. & Schw.) Schm. & Kze.): witches' broom rust, rouille-balai de sorcière: 0 I on 1 Alta F53:131, Man 24:77, Ont 24:48, [828], Que PEI 26:30, NB 23:109, NS 25:62, [1138], Nfld 29:44; on 2 BC [1198]; on 3 BC 4 Yukon [1207]; on 4 BC [15, p. 21], Alta F53:131. Common from Man east, especially in the Atlantic Provinces.
- Merulius* sp.: on living *A. spp.* BC [87].
- M. himantioides* Fr. [*Serpula h.* (Fr.) Bond.]: brown cubical butt rot, carie brune cubique: from 1 Man F51:141, Ont F52:69, Que F57:30, NB NS Nfld [241], in eastern N Am [58]; from 2 BC F58:102, [1203]; from 4 BC F52:150; sporophores collected on 1, F52:76; and from 4 BC [1199].
- M. lacrymans* Wulf. ex Fr. [*Serpula l.* (Wulf. ex Fr.) S. F. Gray]: from 4 BC [1207].
- Milesia fructuosa* Faull (*M. intermedia* Faull): needle rust, rouille des aiguilles: 0 I on 1 Ont Que NS [15, p. 8; 1138]; cultured on 1 from Ont material on *Dryopteris spinulosa* var. *intermedia* (q.v.) [286; cf. 828].
- M. laeviuscula* (Diet. & Holw.) Faull: needle rust, rouille des aiguilles: 0 I on 3 BC F52:152. On current-season needles in coastal BC, presumably wherever rusted *Polypodium* spp. (q.v.) occur; connection established by cultures [1200].
- M. marginalis* Faull & Watson: needle rust, rouille des aiguilles: 0 I on 1 Ont [15, p. 9]; cultured on 1 from Ont material on *Dryopteris spinulosa* var. *marginalis* [286; cf. 828].
- M. pycnographis* Arth. (*Peridermium pycnographis* Bell, *M. polypodophila* Faull): witches' broom rust, rouille-balai de sorcière: 0 I on 1 Ont Que NS [15, p. 8; 1138]; cultured on 1 from Ont material on *Polypodium virginianum* [286; cf. 828].
- M. polystichi* Wineland and *M. vogesiaca* Faull probably occur on *Abies* in BC; II and III on both species are known on *Polystichum munitum*.
- Mucronella aggregata* Fr.: on log of 1 NS [1138].
- Mycoacia alboviride* (Morg.) Miller & Boyle (*Oxydontia a.* (Morg.) L. W. Miller): on 1 Man [93, p. 80].
- Naematelia encephala* (Willd.) Fr.: on 1 NS [1138].
- Naematoloma capnoides* (Fr.) Karst.: on 4 BC [1199].
- N. fasciculare* (Huds. ex Fr.) Karst.: on 3 BC [1207].
- Naucoria geminella* (Pk.) Sacc.: recorded on 4 BC [1198].
- Nectria cucurbitula* Sacc.: on 1 Ont F55:67; and *Creonectria cucurbitula* (Sacc.) Seav.: on 1 Nfld F53:24; on 3 BC 33:103, [50]; probably only a single fungus is present.

Abies

- Nectria modesta* Höhn.: on other pyrenomycetes on 1 Que [53].
- Nothophacidium abietinellum* (Dearn.) Reid & Cain (*Phacidium a.* Dearn.): needle cast, rouge: on 1 Sask Man F54:98, Ont F62:70, [874, p. 195].
- Odontia barba-jovis* Fr. [*Hyphodontia b.* (Fr.) John Erikss.]: on 1 NS [1138].
- O. bicolor* (Alb. & Schw. ex Fr.) Quél.: white stringy rot, carie blanche filandreuse: from 1 Ont F52:69, Que F57:30, Ont NB [792], NB NS Nfld [241]; on 3 BC F60:91, [1207]; from 4 BC F52:149, 151, frequent [792]; recorded on 2 BC [1198]. Sporophores collected in Ont F52:76, and on decayed coniferous logs NS [1138]; for cultural characters see Nobles [792].
- O. crustosa* (Pers.) Quél. [*Hyphodontia c.* (Pers.) John Erikss.]: on 1 NS [1138].
- O. lactea* Karst.: on 1 NS [1138]; on 2, 4 BC [1198].
- O. spathulata* (Fr.) Litsch.: on 1 NS [1138].
- Oidiodendron tenuissimum* (Pk.) Hughes: on bark and sapwood of 1 NB [54].
- Omphalia marginella* (Pers.) Joss. & Maire var. *rugosidisca* (Pk.) Joss. & Sm. (*O. r.* Pk.): on stump and logs of 1 NS [1138].
- Ophiostoma bicolor* Davidson & Wells: from 1 and *Monochamus scutellatus* (Say), Canada [243]. Consistently isolated from discolored cambium of dying or recently killed trees of 1 in Eastern Canada [57].
- Oxydonta alboviride* (Morgan) L. W. Miller: on 1 Man [93, p. 80].
- Panus rudis* Fr.: on 4 BC F52:151.
- Passerinula candida* Sacc.: "Imbedded in the apothecia of a Discomycete" on 1 NS [1138].
- Patinella punctiformis* Rehm: on decorticated 1 NS [1138].
- Pellicularia subcoronata* (Höhn. & Litsch.) Rogers [*Botryobasidium subcoronatum* (Höhn. & Litsch.) Donk], *Corticium s.* Höhn. & Litsch.): on 1 Man [93, p. 76].
- P. vaga* (Berk. & Curt.) Rogers [*Botryobasidium vagum* (Berk. & Curt.) Rogers]: on 1 NS, [1138].
- Peniophora accedens* (Bourd. & Galz., Wakef. & Pears. [*Tubulicrinis a.* (Bourd. & Galz.) Donk]: on 1 Ont [1152].
- P. aspera* (Pers.) Sacc. (*P. setigera* (Fr.) Höhn. & Litsch. [*Hyphoderma setigerum* (Fr.) Donk]): on 1 NS F53:25; on 3 BC [1198], [cf. 1138].
- P. byssoides* (Pers. ex Fr.) Bres. ([*Amphinema b.* (Pers. ex Fr.) John Erikss.] *Coniophora byssoides* (Pers. ex Fr.) Karst.): on 1 NS [1138]; on 4 BC [1198].
- P. carnosa* Burt: on decayed 1 NS [1138]; on 2 BC [1198].
- P. gigantea* (Fr.) Masee [*Phlebia g.* (Fr.) Donk]: isolated once from red heart rot of 1 NB [58]; on 4 BC [1198]. This species and *Hydnum septentrionale* differed from *Polyporus abietinus* (q.v.) in forming, besides CO₂, ethanol as a metabolic product [1159].
- P. gracillima* Ell. & Ev. [a *Tubulicrinis*]: on 1 NS [1138].
- P. greschikii* (Bres.) Bourd. & Galz. [*Fibricium g.* (Bres.) John Erikss.]: on 1 NS [1138].
- P. hamata* Jackson [*Tubulicrinis h.* (Jacks.) Donk]: on coniferous wood, usually 1, Ont [493, p. 133].
- P. incarnata* (Pers. ex Fr.) Karst.: on 3 BC [1207].
- P. inornata* Jackson & Rogers [*Tubulicrinis i.* (Jacks. & Rogers) Donk]: on coniferous wood, usually 1 or *Pinus strobus*, Ont [493, p. 139].
- P. luna* Rom.: on 2 BC [1198].
- P. nivea* (Karst.) Bourd. & Galz.: on 4 BC [1198].
- P. pallidula* (Bres.) Bres. (*P. alutaria* Burt [*Hyphodontia p.* (Bres.) John Erikss.]): on old 1 Man [93, p. 77].
- P. perexigua* Jackson: on 1 Ont [493, p. 132].
- P. pithya* (Pers.) John Erikss.: on 4 Alta F59:92.
- P. pseudo-pini* Weresub & Gibson (*Stereum pini* auct. Am.): brown ray rot, carie brune rayonnante: on 1 Que [1153]; from 1 Ont F52:76.
- P. ralla* Jackson: on bark and wood of 1 Ont [493, p. 137].
- P. sanguinea* (Fr.) Höhn. & Litsch.: on 3 BC [1198].
- P. separans* Burt: on 1 Nfld [793]; on 4 BC F58:102, [1203]. This fungus is *P. piceae* (Pers.) John Erikss., fide Boidin and des Pomeys [95a].
- P. septentrionalis* Laurila: from 1 Nfld [793]; from 4 BC [1198].
- P. tenuis* (Pat.) Masee [*Hyphoderma tenue* (Pat.) Donk]: associated with decay of 1 NB F51:119.
- P. unica* Jackson & Dearden: on 4 BC [499, p. 154; 1198].
- P. viridis* (Preuss) Bres.: on 3 BC [1207].
- Peridermium balsameum* Pk.: on needles of 1 Ont 22:190, Que 32:98, NS [1138]; causes some needle cast of immature trees Que F57:30. Collections on this host referable to this collective species cause the 'white' rusts, *Uredinopsis* and *Milesia* (q.v.), on ferns.
- P. holwayi* Syd.: on needles of 1 Alta F53:131; on 4 BC Alta F52:123, Yukon F61:24, [1207]. Although Arthur [15, p. 19] lists this binomial among the synonyms of the aecial state of *Pucciniastrum goepertianum* (q.v.), Ziller (in litt.) considers the two distinct.
- Phacidium abietis* (Dearn.) Reid & Cain: on 1 Ont Que [875, p. 485].
- P. balsameae* Davis ([*Sarcotrichia b.* (Davis) Korf], *Stegopezizella b.* (Davis) Syd.): needle blight, brûlure des aiguilles: several collections on 1 Ont [101, 875], Que F53:49; on 4 BC [875].
- P. infestans* Karst.: snow blight, brûlure printanière: on 1 Que F36:37; an important parasite of immature trees, but see above.
- Phaeocryptopus nudus* (Pk.) Petrak (*Adelopus balsamicola* (Pk.) Theiss., *A. nudus* (Pk.) Höhn., *Asterina nuda* Pk.): needle blight, rouge: on 1 Ont 29:60, Que F56:37, [53], NB 29:60, NS 43:103, PEI Nfld F53:23; on 2, 4 BC [1207]. Locally severe, but usually an unimportant disease of immature trees; collected in NB in 1892 [1138; cf. 403].
- Phlebia albida* v. Post ex Fr.: on 2, 4 BC [1198]; on 3 BC [1207].
- P. radiata* Fr.: on 3, 4 BC [1207].
- Pholiota adiposa* (Fr.) Kummer: brown mottled rot, carie brune madrée: from heartwood decay of 1 NB F51:119; for culture characters see Nobles [791]. The fungus is *P. aurivella* [375].
- P. aurivella* (Batsch ex Fr.) Kummer: on 3, 4 BC [1207]; on 3 BC F60:109.
- P. spectabilis* (Weinm. ex Fr.) Quél.: brown mottled rot, carie brune madrée: on 1 NS [1138]; on 4 BC [1198].
- P. squarrosa* (Pers. ex Fr.) Kummer: on 4 BC [1198].
- P. squarroso-adiposa* Lange: brown mottled rot, carie brune madrée: on 3 BC [1198].
- Phomopsis* sp.: canker and dieback, chancre et dépérissement: on 1 Ont F54:76; on 4 BC [1207].
- Phragmocephala minima* Mason & Hughes: on 1 Nfld F53:25.
- Phyllotopsis nidulans* (Pers. ex Fr.) Singer (*Claudopus n.* (Pers. ex Fr.) Karst.): on 4 BC [1198]; recorded on 3 BC [1207].

- Pithya vulgaris* Fckl.: on 4 BC [1198].
- Platyglœa pustulata* Martin & Cain: on bark of 1 Ont Que [673, p. 691].
- Pleonectria calonectrioides* Wr.: on 1 Que 34:72.
- Pleurophomella eumorpha* (Penz. & Sacc.) Höhn.: on 1 alone or with the perfect state, 'Tympanis pinastri' (q.v.), NS [1138].
- Pleurotus ostreatus* (Jacq. ex Fr.) Kummer: on 3 BC [1198].
- P. porrigens* (Pers. ex Fr.) Kummer: on 3 BC [1199].
- P. serotinus* (Schr. ex Fr.) Kummer: on 4 BC [1198].
- Polyporus abieticola* Overh.: on 1 Que [812].
- P. abietinus* Dicks. ex Fr.: white pocket rot, carie blanche de l'aubier: on 1 Sask Man 48:94, Ont F51:130, Que [791], NB NS PEI [1138], Nfld F53:21; on 2, 3 BC [1198]; from 4 BC F52:149; butt rot of heartwood of 4 BC [87]; uncommon on 2 BC [149]. Common cause of decay of dead and windfallen trees of 1 in eastern N Am, but rare as a butt rot [58]. Although a study of the carbon balance of 39 species of wood-rotting fungi revealed that the metabolism is channelled toward CO₂ and mycelium production, in three species under continuous aeration only 50–60% was so converted [1158]; in this species the metabolic product causing a 'high carbon-unaccounted-for fraction' proved to be D-mannitol [1159]; for culture studies see Nobles [791].
- P. adustus* Willd. ex Fr.: on 4 BC [1198].
- P. albellus* Pk.: recorded on 4 BC [982].
- P. alboluteus* Ell. & Ev.: on 2, 4 BC [1198].
- P. amorphus* Fr.: on *A. sp.* BC [1198].
- P. anceps* Pk.: red ray rot, carie rouge rayonnante: on 1 NS F53:25.
- P. balsameus* Pk.: brown conical rot, carie brune cubique: causes a butt rot of coniferous trees: on 1 Sask Man 48:94, Ont Que 22:189, NB 49:94, NS [1138]; from 1 NB NS Nfld [241]; from 4 BC [791]; frequent in eastern N Am [53]; for culture studies see Nobles [791].
- P. borealis* Fr.: white mottled rot, carie blanche madrée: on 1 NB [1138]; from 4 BC [1198].
- P. caesius* Schrad. ex Fr.: on 1 NS [1138].
- P. cuneatus* (Murr.) Zeller: recorded on 3 BC [982].
- P. destructor* Schrad. ex Fr.: on 1 NS; "determination is doubtful" [1138].
- P. destructor* var. *resupinatus* (*Leptoporus d.* (Schr. ex Fr.) Bourd. & Galz. var. *r.* Bourd. & Galz.): on 3 BC [1207].
- P. dryadeus* Pers. ex Fr.: on 3 BC [1198].
- P. elegans* Bull. ex Fr.: culture from 4 BC [1198].
- P. fibrillosus* Karst.: causes a brown rot mainly of conifers: on *A. spp.* and other genera BC Man Ont Que, and on 1 in E. Canada [810], Ont [791], NS PEI, not common [1138]; for culture studies see Nobles [791].
- P. guttulatus* Pk.: brown cubical rot, carie brune cubique: on 1 and other coniferous wood BC Man Ont Que [810], NS PEI [1138]; from 1 Que [791]; for culture studies see Nobles [791].
- P. hirsutus* Wulf. ex Fr.: on 3 BC [1199].
- P. hirtus* Quél.: brown cubical rot, carie brune cubique: at base of 1 NS [1138]; on 3 BC [1198]; mainly from 4 BC [87].
- P. leucospongia* Cke. & Harkn.: on 4 BC [1207].
- P. mollis* Pers. ex Fr.: brown rot of coniferous trees: from 1 Que [791]; see culture studies by Nobles [791].
- P. montanus* (Quél.) Ferry: causes a white laminate rot of conifers; from 3 BC; also culture studies by Nobles [791].
- P. osseus* Kalchbr. and *P. picipes* Fr.: on 4 BC [1198].
- P. resinosis* Schrad. ex Fr.: brown cubical rot, carie brune cubique: once from a butt rot of 1 Ont [58]; on 3 BC [1203].
- P. schweinitzii* Fr.: brown cubical rot, carie brune cubique: on *A. spp.*, etc., BC Man Ont Que [810], NB NS PEI [1138]; on or from 1 Man [93, p. 83], NB 29:60, NB NS Nfld [241]; from 2, 4 BC [1198]. On roots and bases of conifers: infrequently from butt rot in eastern N. America [58].
- P. sulphureus* Bull. ex Fr.: brown cubical rot, carie brune cubique: on or from 2 BC [149]; on or from 3, 4 BC [1198].
- P. tomentosus* Fr. (*P. circinatus* auct. non Fr. [791]): red butt rot, carie rouge alvéolaire du pied: from decay of 1 Que F57:30; rarely from butt rot of 1 Ont NB [58]; on 2 BC [149, 1203]; from root and butt rot of *A. spp.* BC [87].
- P. tomentosus* var. *circinatus* (Fr.) Sartory & Maire (*P. circinatus* Fr., *P. dualis* Pk.): red butt rot, carie rouge alvéolaire du pied: on 4 BC F52:151.
- P. undosus* Pk. and *P. varius* Fr.: on 2 BC [1198].
- P. volvatus* Pk.: red butt rot, carie rouge du pied: once from 1 NB [58]; from 2, on 3, recorded from 4 BC [1198].
- Poria albipellucida* Baxt.: on *A. sp.* BC [1198].
- P. albolutescens* (Rom.) Egel. and *P. aurea* Pk.: on 4 BC [1198].
- P. candidissima* (Schw.) Cke.: on 1 NS [1138]; on 2, 4 BC [1198]. Not a *Poria*, but it has been called *Cristella c.* (Schw.) Donk and *Phlebiella c.* (Schw.) Bond. & Sing.
- P. carbonica* Overh.: on 3 BC [1198].
- P. cinerascens* Bres.: on 4 BC [1207].
- P. coloreia* Overh. & Englerth (*P. subacida* q.v.): recorded from 4 BC [1198].
- P. corticola* (Fr.) Cke.: on 4 BC [1198].
- P. crustulina* Bres.: on 1 NS [1138]; on 3, 4 BC [1198].
- P. ferrugineofusca* Karst.: causes a yellow ring rot.: on 4 BC [1198]; from 4 BC in culture studies [791].
- P. ferruginosa* (Schr. ex Fr.) Karst.: on 1 NS [1138].
- P. lenta* Overh. & Lowe: from 4 BC [1198].
- P. rixosa* Karst.: on 3 BC [982]; on 4 BC [1198].
- P. sericeomollis* (Rom.) Egel. (*P. asiatica* (Pilát) Overh.): recorded on 4 BC [1198].
- P. subacida* (Pk.) Sacc.: white stringy rot, carie blanche filandreuse: from 1 Ont Que [791], Que 23:119, NB 49:44, NB NS [241]; an important cause of rot Ont NB [58]; sometimes a common root and butt rot of 2 BC [149] and 4 BC [87]; on 3 BC [1207]; for cultural studies see Nobles [791].
- P. subincarnata* (Pk.) Murr.: on 2, 4 BC [1198].
- P. tarda* (Berk.) Cke. (*P. semitincta* (Pk.) Cke.): on 4 BC [1207].
- P. taxicola* (Pers.) Cke. (*P. rufa* (Schr. ex Fr.): causes a yellow rot of coniferous trees; on 4 BC [1198]; from 4 BC in culture studies [791].
- P. tsugina* (Murr.) Sacc. & Trott.: on *A. spp.* BC [87]; on 4 BC [1198].
- P. versipora* (Pers.) Rom.: on 3 BC [1198].
- P. vulgaris* (Fr.) Cke. sensu Rom.: on 1 NS [1138].
- P. weirii* Murr.: yellow ring rot, carie jaune annelée: recorded from 2, 3 BC 41:81; recorded from 4 BC 48:96; sporophores on 2, 4 BC [1198].
- P. xantha* (Fr.) Cke.: causes a brown cubical

Abies

- rot; from *A. spp.* BC [791]; on 4 BC [1198]; see culture studies by Nobles [791].
- Potebniamyces balsamicola* Smerlis: on 1 Que NB [1029, p. 352].
- Pseudohydnum gelatinosum* (Fr.) Karst.: recorded on 4 BC [982].
- Pseudoplectania vogesaica* (Pers.) Seaver: on 1 NS [1138].
- Pucciniastrum epilobii* Otth s. lat. (*P. abietis-chamaenerii* Kleb., *P. pustulatum* (Pers.) Diet.): needle rust, rouille des aiguilles: 0 1 on 1 Alta [15, p. 15], Ont 22:190, NS [15], Nfld F53:26; on 2 BC [15]; on 3 BC [1199]; on 4 Alaska [175], Yukon F61:124, BC [15], Alta F52:123; on 25 BC F57:86; on 6 BC [1199]; on cones of 4 Aleza L., BC F53:155. Sometimes causes severe defoliation of 4 in parts of BC F55:103, [cf. 828].
- Faull [290] has shown that *P. epilobii* sensu lat. comprises two species, *P. epilobii* s. strict. and *P. pustulatum* with 0 I states on *Abies*. According to him, *P. epilobii* occurs more often and more severely on needles of the current season's growth on the upper part of the tree, whereas *P. pustulatum* is localized more often on the lower part of the new growth.
- Savile [964], as a result of a study of specimens in DAOM, reported these rusts on *Abies* as follows: *P. epilobii* Otth (*P. abietis-chamaenerii* Kleb.): on 1 Que; on 4 Mont.
- P. pustulatum* Diet.: on 1 Ont NS Nfld; on 3 Wash Idaho; on 4 BC. He also discusses their separation.
- P. goeppertianum* (Kühn) Kleb. (*Calypsotheca goeppertiana* Kühn, *Peridermium columnare* (Alb. & Schw.) Schmidt & Kunze): needle rust, rouille des aiguilles: 0 (rare) I on 1 Sask [15, p. 19], Man F60:80, Ont 22:189, F55:63, [828], Que NS [15], on 3 BC F53:155; on 4 BC Alta [15].
- Pycnoporus cinnabarinus* (Jacq. ex Fr.) Karst. (*Pycnoporus c.* Jacq. ex Fr.): recorded on 3 BC [982].
- Radulum orbiculare* Fr.: on 1 NB F53:26, NS [1138].
- Rehmiellopsis abietis* (E. Rostr.) O. Rostr. (*R. bohémica* Bub. & Kab.): needle blight, brûlure des aiguilles: on 4 BC 45:101, [50].
- R. balsameae* Waterman (not *R. bohémica*): tip blight, brûlure des pousses: on 1 Sask F53:108, Ont F53:86, ?Que NS 44:98, 45:101, F58:27, NB F55:25.
- Retinocylus abietis* (Crouan) Groves & Wells: on 1 Que 60:44; on 4 BC F57:86, [1199].
- Rhinocladia elatior* Mangenot: isolated from 4 BC [1198].
- Rhizosphaeria abietis* Mang. & Har.: needle blight, brûlure des aiguilles: associated with *Rhizothyrium abietis* (q.v.).
- R. pini* (Cda.) Maubl.: needle blight, brûlure des aiguilles: on 1 Ont F57:51; on 4 BC [1199].
- Rhizothyrium abietis* Naum.: needle cast, rouge: on dead needles of 1 NB Nfld 55:155, F55:26.
- Schizophyllum commune* Fr.: on windfalls of 1 Nfld F53:21.
- Scleroderris abieticola* Zeller & Gooding: on 4 BC [1207].
- Scolecocytrina balsamea* (Cke. & Pk.) Seaver (*Thyronectria b.* (Cke. & Pk.) Sealer): on 1 Alta F62:102, Man [93, p. 46], Ont, associated with canker and dieback, F58:58, Que 33:103, NS [1138], PEI F53:26; on 4 BC F57:70, [1199].
- S. scolecospora* (Bref.) Seaver: on 1 NS [1138].
- Scorias spongiosa* (Fr.) Schw.: on 1 NS [1138].
- Scutellinia scutellata* (L. ex Fr.) Lambotte (*Patella s.* (L. ex Fr.) Morgan): on 4 BC [1198].
- Stereum abietinum* (Pers. ex Fr.) Fr.: brown cubical rot, carie brune cubique: on 1 NS [1138]; from 2, recorded on 3 BC [1198]; on 4 BC [1198]; common cause of decay of 2 BC [149].
- S. chailletii* (Pers. ex Fr.) Fr. [*Amylostereum c.* (Pers. ex Fr.) Boid.]: white stringy rot, carie blanche filandreuse: on and/or from 1 Man F51:141, Ont F51:130, NB NS Nfld [241], Nfld F52:20; on and/or from 2, 3, 4 BC [1198], Alta F51:141; rather common in early stages of deterioration F52:20. This fungus and ?*Cephalosporium* sp. were the main fungi isolated from stained sapwood of 1 trees dead for less than a year [57]; infrequent as a reddish trunk rot, but an important saprophyte of dead trees of 1 in eastern N Am [58]; from 1 after artificial injury Que [282]. From decay of 1 killed by the spruce budworm, *Chorestoneura fumiferans* (Clem.), or weakened by the balsam woolly aphid, *Adelges piceae* Ratz., in NB. The decay was associated with activity of wood wasps [1057].
- S. ostrea* (Blume & Nees ex Fr.) Fr. (*S. fasciatum* (Schw.) Fr.): from 1 Que F57:30; from 4 BC [1198].
- S. purpureum* (Pers. ex Fr.) Fr.: from 1 Que [282]; from 4 BC [1198].
- S. rugisporum* (Ell. & Ev.) Burt: on 4 BC [1198].
- S. sanguinolentum* (Alb. & Schw. ex Fr.) Fr.: red heart-rot, carie rouge du sapin: from 1 Alta Sask Man F51:141, Ont Que NB 24:47, NS [1138], Nfld F52:20, [cf. 241]; mainly on 4 BC [87], F52:149, Alta 48:94; recorded on 2 BC [982]; on 3 BC [1207]; cause of most trunk rot of 1 in eastern N Am [58]; important cause of butt rot and windthrow [677]; common in broken tops of young 1 NB after an ice storm in 1956, F58:25; for culture studies see Nobles [791]; from 1 after artificial injury, Que; *S. sanguinolentum* was the most important [282].
- S. sulcatum* Burt in Peck: on *A. sp.* and from 4 BC; a conidium-bearing species [674]; on 4 BC [1198].
- Stypella papillata* Möll.: on 1 Ont [619].
- Tomentella tristis* (Karst.) Höhn. & Litsch. (*Hypochnus umbrinus* (Fr.) Qué. sensu Burt): on ?1 Man [93, p. 77].
- Toxisporium abietinum* Vuill.: on needles of 1 NS [1138].
- Trametes tenuis* Karst.: on 4 BC [1207].
- Trechispora brinkmanni* (Bres.) Rogers & Jackson [*Sistotrema b.* (Bres.) John Erikss.]: red heartrot, carie rouge du cœur: from 4 BC [1198].
- T. raduloides* (Karst.) Rogers [*Sistotrema r.* (Karst.) Donk]: red heartrot, carie rouge du cœur: from 1 Ont NS [58]; from 4 BC [58, 1198].
- Tremella foliacea* Pers. ex Fr.: on 1 NS [1138]; on 4 BC [1198].
- T. mycophaga* G. W. Martin: on *Aleurodiscus amorphus* (q.v.) on 1 Ont Que [673, p. 687].
- T. saccharina* Fr. var. *foliacea* (Bref.) Bres.: on bark of dead 1 Man Ont [93, p. 74].
- Trichosphaeria parasitica* Hartig: white felt blight, feutrage blanc: common on blighted needles of 1 Que F56:37, F57:30.
- Trichothecium roseum* (Pers.) Lk.: from seeds of 1 Ont [374].
- Tuberculina persicina* Sacc.: on *Uredinopsis pteridis* on 3 BC F60:109.
- Tympanis abietina* Groves: on 1 Ont Que NB NS Nfld [372, p. 600]; on 4 BC [1198].
- T. pinastri* Tul. and *T. pithya* (Fr.) Karst.: on 1 NS [1138]. Groves later named these collections *T. abietina* and *T. truncatula* respectively.

- Tympanis truncatula* (Pers. ex Fr.) Rehm.: on 1 Ont NS Nfld [372].
- Uredinopsis americana* Syd. (*U. mirabilis* (Pk.) Magn.): needle rust, rouille des aiguilles: 0 I on 1 Ont NS Nfld [15, p. 3]; cultured on 1 from Ont and NS material [289]. Wherever the respective fern hosts are found infected in Canada these rusts presumably occur on *Abies*; the perfect state of this rust occurs on *Onoclea sensibilis* (q.v.) [cf. 828].
- U. atkinsonii* Magn.: 0 I on 1 NS, identified by inoculation of *Dryopteris thelypteris* var. *pubescens* by Fraser [289].
- U. ceratophora* Faull: 0 I known on 1 only from Ont material on *Cystopteris bulbifera* [289; cf. 828].
- U. hashiokai* Hirats.f. (*U. aspera* Faull): 0 I on needles, 10 months to 4 years old, of 3, 4 in coastal BC, presumably wherever rusted *Pteridium aquilinum* var. *lanuginosum* occurs; connection established by cultures [1201].
- U. longimucronata* Faull f. *cyclosora* Faull: 0 I on 2, 4 BC; identified by inoculation of *Athyrium felix-femina*, F52:151.
- U. longimucronata* Faull f. *longimucronata*: 0 I on 1 from Ont material [289]; presumably on 1 above rusted *Athyrium felix-femina* (q.v.), Man [93, p. 64], [cf. 828].
- U. osmundae* Magn.: 0 I on 1 NS [15, p. 3]; cultured on 1 from Ont and NS material [289; also 828, 1138].
- U. phegopteridis* Arth.: 0 I on 1 NS [15, p. 5]; cultured on 1 from Ont and NS material [289]; on 4 BC identified by inoculation of *Dryopteris disjuncta* (q.v.) F52:151 [cf. 828].
- U. pteridis* Diet. & Holw. (*U. macrosperma* (Cke.) Magn.: 0 I on needles 10 months to 4 years old of 3, 4 BC, confirmed by inoculations. Urediniospores from *Pteridium aquilinum* var. *lanuginosum* occur in two forms, long-spored and short-spored, the latter known only on the coast [1201]; on 3 BC 41:81; on seedlings of 4 Alta F51:143.
- U. struthiopteridis* Störmer ex Diet.: 0 I on 1 Sask [93, p. 64], NS [15, p. 4]; cultured on 1 from Ont NS material [289, 1138], [cf. 828].
- U. arthuri* Faull presumably occurs on 1 in Que; II III states occur on *Woodwardia virginica*.
- Valsa* sp. and associated *Cytospora* sp.: normally saprophytic but may cause canker and dieback of 1 Ont after insect attack or mechanical injury, F57:50; also on 4 BC [1207].
- V. abietis* Fr.: recorded on 1 PEI [1138]; recorded on 3 BC [982].
- V. friesii* Duby: canker, chancre cytosporéen: on 1 Que F56:37; common in central NB F54:24, F55:25, NS [285].
- V. kunzei* Fr. (*Leucostoma k.* (Fr.) Munk): on 1 Ont F54:76, Que F56:37, NB F63:37, NS [1138]; a weak parasite.
- Vararia* n. sp. inedit.: on 4 BC [1203].
- V. granulosa* (Pers. ex Fr.) Laurila: on *A. sp.* Ont [674]; on 2, from 4 BC [1198]; a conidium-bearing species [674].
- V. racemosa* (Burt) Rogers & Jackson: on 4 BC [1198].
- Volutella ciliata* Alb. & Schw. ex Fr. var. *stipitata* Sacc.: on cones of 1 Que 34:94.
- Xeromphalina campanella* (Batsch ex Fr.) Kühner & Maire: white stringy rot, carie blanche filandreuse: known only from conifers; from decay in *A. spp.* BC [87]; in 1 Ont F52:69, Que [791], NB NS PEI [241]; in eastern N Am [58]; for culture characters see Nobles [791].
- X. fulvipes* (Murr.) Smith: recorded on 3 BC [1207].

Zythia resiniae (Ehr. ex Fr.) Karst.: on 1 Que F60:44.

Abutilon Mill.

MALVACEAE

Herbs or shrubs, mostly in warm countries, grown for ornament or occasionally becoming weeds.

Botrytis cinerea Pers.: on *A. sp.* Alaska [175].

Meloidogyne incognita (Kofoid & White) Chitwood: root-knot nematode, nodosité des racines: on *A. sp.* grown as a house plant, Saskatoon, Sask 56:123.

Acer L.

ACERACEAE

Deciduous, rarely evergreen, trees or occasionally shrubs; several important native species occur and some exotic species from other parts of the north temperate zone are grown for their handsome foliage. The native species are:

1. *A. circinatum* Pursh, vine maple, érable circiné; usually a shrub, in Canada on Vancouver I. and the adjacent mainland of BC.
2. *A. glabrum* Torr., Rocky Mountain maple, érable nain; replaced in Canada by *A. g.* var. *douglasii* (Hook.) Dipp., Douglas maple, érable nain. Shrub or small tree, occurring from Alaska along the coast, throughout southern BC and into southern Alta.
3. *A. macrophyllum* Pursh, broadleaf maple, érable à grandes feuilles; large tree, in Canada along coast and on islands of BC; locally important as a hardwood.
4. *A. negundo* L., box-elder, érable à Giguère; small tree, native in n.w. Ont but much planted and naturalized east to NS. *A. n.* var. *interius* (Britt.) Sarg., Manitoba maple, érable négundo de l'intérieur; common in the prairie region. Popular for street planting and shelter belts because of its rapid growth and hardiness; wood used locally for boxes and rough construction.
5. *A. pensylvanicum* L., striped maple, bois barré; shrub or small tree, in Canada from Cape Breton I. to beyond L. Superior. Buds and twigs provide winter food for deer and moose.
6. *A. rubrum* L., red maple, érable rouge; a tree when growing on deep moist soils, common but not plentiful, in Canada from s. Nfld to the Ont-Man boundary; not an important timber species.
7. *A. saccharinum* L., silver maple, plaine blanche; large tree, in Canada from s. NB to s. Que and Ont; used for furniture. 7a, *A. s.* var. *laciniatum* (Carr.) Pax (*A. s.* var. *wieri* Schwerin), Wier maple.

Acer

8. *A. saccharum* Marsh., sugar maple, érable à sucre; one of the tallest hardwoods in Canada, ranging from NS to the Lake of the Woods; very valuable hardwood and also the principal source of maple syrup and maple sugar. *A. nigrum* Michx.f., black maple, érable noir, is so similar to the above that it is rarely recognized as a substrate for fungi; in Canada confined almost entirely to s. Ont.
 9. *A. spicatum* Lam., mountain maple, plaine bâtarde; small, usually bushy, tree; in Canada from Nfld to central Sask.
Two introduced trees cult. as lawn or shade trees in E. Canada are:
 10. *A. platanoides* L., Norway maple, érable de Norvège; from Europe.
 11. *A. pseudoplatanus* L., sycamore maple, érable blanc; from Europe and w. Asia.
- Other hosts: 12, *A. ginnala* Maxim., Amur maple, érable de tartarie. 13, *A. palmatum* Thunb., Japanese maple, érable du Japon.
- Acrospermum cuneolum* Dearn. & House: on 9 NB [1138].
- Aleurodiscus acerinus* (Pers. ex Fr.) Höhn & Litsch. var. *alliaceus* (Qué.) Bourd. & Galz.: on 8 Ont [797].
- A. acerinus* var. *dryinus* (Pers.) Bourd. & Galz.: on 8 Ont [797].
- A. botryosus* Burt: on 9 Ont [599].
- A. cerussatus* (Bres.) Höhn & Litsch.: on *A. sp.* Ont [599].
- A. oakesii* (Berk. & Curt.) Höhn.: on 8 Ont [599].
- Armillaria mellea* (Vahl ex Fr.) Kummer: root rot, pourridié-agaric: on 3 BC [1198]; on 5, 6, 8 Ont F54:56; from decayed 8 NB NS F53:22; cause of a root and butt rot of 8 Ont F51:135.
- Bertia moriformis* (Tode) de Not.: on wood of 4 Man [93, p. 50]; on 9, etc., NS [1138].
- Camarosporium negundinis* Ell. & Ev.: on branches of 4 Man [93, p. 132].
- Cenangium griseum* Dearn. & Barth.: on *A. sp.* Ont [811].
- Ceratobasidium anceps* (Bres. & Syd.) Jackson: on 9 Ont [495, p. 241].
- Cercospora aceris* Dearn. & Barth.: on 3 BC [1198].
- Chlorosplenium aeruginascens* (Nyl.) Karst.: on 3 BC [1198].
- Ciboria acericola* Groves & Elliott: on dead parts of *A. sp.* Ont Que [378].
- C. acerina* Whetz. & Buchw. ex Groves & Elliott: on dead inflorescences of *A. sp.*, usually 6, Ont Que [378].
- Cladosporium humile* Davis: leaf spot, tache des feuilles: heavy on 6 NB F56:26, NS 52:101; perfect state *Venturia acerina* Plakidas, nom. nud. (Mycologia 39:34, 1952).
- Clavaria stricta* Pers. ex Fr.: on 8 Ont [797].
- Coccomyces coronatus* (Schum.) de Not.: on dead leaves of *A. sp.* NS [1138].
- Collybia lacunosa* Pk.: on rotten logs of *A. sp.* NS [1138].
- C. velutipes* (Curt. ex Fr.) Kummer: white spongy rot, carie blanche spongieuse: from decay of 8 Ont [797].
- Comatricha suksdorfii* Ell. & Ev.: on living twigs of 6 Que F60:44.
- Coniophora betulae* (Schum.) Karst.: on 8 Ont [797].
- C. suffocata* (Pk.) Masee: on wood of 4 Man [93, p. 75].
- Conoplea sphaerica* (Pers.) Pers.: on *A. sp.* Ont [484].
- Cordana pauciseptata* Preuss: on wood of *A. sp.* Que [480].
- Corirolellus malicola* (Berk. & Curt.) Murr. (*Trametes m.* Berk. & Curt.): on 8 Ont [797].
- Corticium sp.* (*C. centrifugum* (Lév.) Bres. complex): on 5 NS [1138].
- C. analogum* (Bourd. & Galz.) Burt [*Hypochnicium a.* (Bourd. & Galz.) John Erikss.]: on 3 BC [1198].
- C. bombycinum* (Sommerf.) Bres. [*Hypochnicium b.* (Sommerf.) John Erikss.]: on 9 NS [1138].
- C. confluens* Fr.: on 8 Ont [797].
- C. galactinum* Fr.: on 8 Ont [797]; see *Abies*.
- C. laeve* Pers. ex Fr.: on 3 BC [1198]; see *Abies*.
- C. leucoanthum* Bres. [*Gloeocystidiellum l.* (Bres.) Boid.]: on 8 NS [1138].
- C. pini-canadensis* (Schw.) Rogers & Jackson: on 8 Ont [797].
- C. rillum* Jackson [*Xenasma r.* (Jacks.) Liberta]: on bark of *A. sp.* Ont [498, p. 716].
- C. scutellare* Berk. & Curt.: on 8 Ont [797].
- C. sulphureum* (Pers. ex Fr.) Fr.: on 3 BC [1198]; see *Abies*.
- C. tuberculatum* Karst.: on 8 Ont [797].
- C. vellereum* Ell. & Cragin: white spongy rot, carie blanche spongieuse: from decayed 8 Ont F52:76; studied in culture by Nobles & Nordin [796].
- Crepidotus fulvotomentosus* Pk.: on 3 BC [1198].
- Cryptodiaporthe acerinum* Reid & Cain: on 6 Que F63:48.
- C. densissima* (Ell.) Wehm. var. *spicata* (Ell. & Ev.) Wehm.: on 9 Ont F59:66.
- C. myinda* (Cke. & Ell.) Wehm.: on 8 Ont F60:67.
- Cylindrosporium negundinis* Ell. & Ev.: on 4 Ont 25:65; probably a state of *Septoria negundinis* (q.v.).
- Cytospora ambiens* Sacc.: on 11 showing severe dieback NS 52:101.
- C. annulata* Ell. & Ev.: on twigs of 4 Sask Man [93, p. 133].
- C. chrysosperma* (Pers.) Fr.: recorded on 2 BC [1199]; severe on 8 Que 46:118; common on 10 Que 44:121.
- C. pulcherrima* Dearn. & Hansbr.: on 2 BC [253].
- Dacrymyces palmatus* (Schw.) Bres.: on 9 NS [1138].
- Daedalea confragosa* Bolt. ex Fr. and *D. quercina* L. ex Fr.: on 8 Ont [797].
- D. unicolor* Bull. ex Fr.: white spongy rot, carie blanche spongieuse: common on 4 Man [93, p. 81]; on 5 NB [1138]; isolated from decayed 6 NB 50:113; from 8 Que F53:48; very common on decaying hardwood [fide 1138]. As the result of a detailed study of the species, van der Westheuzen [1155] places the fungus in *Cerrena* Mich. ex S.F. Gray as *C. unicolor* (Bull. ex Fr.) Murr.
- Dermea acerina* (Pk.) Rehm (stat. conid. *Sphaeronema acerina* Pk.): on 6 Ont Que [370], NS [1138]; on 8 Ont Que [370].
- Diaporthe acerina* (Pk.) Sacc.: on 9 Ont F60:66, NS [1138].
- D. dubia* Nit.: on 8 Ont F60:67.
- D. eres* Nit.: on *A. sp.* BC [50].
- Diatrype hochelagae* Ell. & Ev.: on old 4 Man [93, p. 59].
- D. stigma* (Hoffm.) Fr.: on *A. sp.* Ont 34:94; on 6, 8 Ont F59:66.
- Diatrypella frostii* Pk.: on *A. sp.* Ont F59:66.

- Diplodia patrata* (Desm.) Sacc.: on 4 Man [93, p. 133].
- Eutypa ludibunda* Sacc.: on 24 Man [93, p. 57].
- E. milliaria* (Fr.) Sacc.: on decorticated *A.* sp. NS [1138].
- Eutypella parasitica* Davidson & Lorenz: on 8 Ont F59:66.
- E. stellulata* (Fr.) Sacc.: canker, chancre eutypelléen: occasionally on *A.* spp. Ont F54:76.
- Exidia nucleata* (Schw.) Burt: on bark of *A.* sp. NS [1138].
- Favolus alveolaris* (DC. ex Fr.) Quél. (*F. canadensis* Klotzsch): on dead branches of 4 Man [93, p. 81]; on 8 Ont [797].
- Fenestella phaeospora* Sacc.: on branches of 4 Man [93, p. 57].
- Fomes annosus* (Fr.) Karst.: fomes root rot, maladie du rond: on 3 BC [1198].
- F. connatus* (Weinm.) Gill.: white spongy rot, carie blanche spongieuse: on dead 4 Man [93, p. 81]; on 5 NB [1138]; on 6 Ont F54:76; on 8 Ont F54:76, Que F53:49, NS PEI [1138]; from decayed 6 NB 50:113. Cause of a soft rot of broad-leaved trees, esp. *A.* spp.; for culture studies see Nobles [791].
- F. everhartii* (Ell. & Gall.) Schrenk & Spauld.: white spongy rot, carie blanche spongieuse: on 8 Ont [797].
- F. fomentarius* (L. ex Fr.) Kickx: white mottled rot, carie blanche madrée: on *A.* sp. NS [1138]; on 6, 8 Ont F55:62; isolated from decayed 8 NS 50:113. An important cause of sapwood decay in hardwood stands.
- F. fraxineus* (Bull. ex Fr.) Cke.: white spongy rot, carie blanche spongieuse: from decay of 8 Ont [797].
- F. ignarius* (L. ex Fr.) Gill.: white trunk rot, carie blanche du tronc: known from 2, 3 BC F54:129; from 5, 6, 8, 9 Ont F55:59, NB F54:24; from 6, 8 NS F54:24. For distribution maps of this species in hardwoods see F54:27 et seq.; for culture studies see Nobles [791].
- F. ignarius* var. *laevigatus* (Fr.) Overh.: on 8 Ont [797].
- F. ignarius* var. *nigricans* auct. Am.: on 5 NB PEI [1138].
- F. pinicola* (Sw. ex Fr.) Cke.: isolated from 8 Ont F51:135.
- F. scutellatus* (Schw.) Cke.: on dead branches of 4 Man [93, p. 81].
- Fusarium acuminatum* (Ell. & Ev.) Wr. (*F. scirpi* Lamb. & Fautr. var. *acuminatum* (Ell. & Ev.) Wr.): on branches of 4 Man [93, p. 118]; from overwintered seed of 4 Man [335].
- F. lateritium* Nees: doubtfully on 4 Man [93].
- F. reticulatum* Mont. var. *negundinis* (Sherb.) Wr.: red stain, rougissure: suspected on 4 Man [93].
- F. sambucinum* Fckl.: one isolation from 4 Man [93].
- F. solani* (Mart.) App. & Wr.: on 10 Ont F62:70.
- F. sporotrichioides* Sherb.: isolated from discolored twigs of 4 Man [93, 335].
- Ganoderma applanatum* (Pers. ex Fr.) Pat. (*Fomes applanatus* (Pers. ex Fr.) Wallr.): white mottled rot, carie blanche madrée: on 3 BC [1198]; from 8 Ont F51:135; on dead wood of many hardwoods including *A.* spp. NS [1138].
- G. lobatum* (Schw.) Atk.: causes a white rot of broad-leaved trees: "no collections . . . recorded from Canada except from southernmost part of Ontario;" culture studies based on US isolates [791].
- Gloeosporium apocryptum* Ell. & Ev. [*Kabatiella apocrypta* (Ell. & Ev.) Arx, 15a, p. 45]: large leaf spot, tache grande des feuilles: on 6 NS 52:101; on 27 Que 49:94; on 8 Que 55:115, NB NS 53:104, PEI 29:61; on 9 Nfld F61:18; on 10 Ont 27:90, Que 51:104; on 13 Ont 56:118.
- G. decolorans* Ell. & Ev.: on 6 Que F61:53; on 8 Ont 31:117, NS F58:28; records under this name and the next may more properly belong under *G. apocryptum*.
- G. saccharinum* Ell. & Ev. [*Kabatiella apocrypta* (Ell. & Ev.) Arx.]: on 8 PEI 56:118, [see 1138 under *Phyllosticta minima*].
- G. tremellinum* Sacc.: on 9 Man [93, p. 130].
- Gnomonia setacea* (Pers.) Ces. & de Not.: on leaves of 3 BC [50].
- Grandinia helvetica* (Pers.) Fr.: on 8 Ont [797].
- Graphium giganteum* Speg.: on 8 Que F62:50.
- Guepinia elegans* Berk. & Curt.: on fallen 4 Man [93, p. 74].
- Helicobasidium candidum* G. W. Martin: on *A.* sp. Duchesnay, Que [673, p. 693].
- Helicoma curtisii* Berk.: stat. conid. of *Herpotrichia pezizula* (q.v.).
- Helotium epiphyllum* (Pers.) Fr.: on leaves of *A.* spp. NS [1138].
- H. virgultorum* (Vahl ex Fr.) Karst.: on 3 BC [1199].
- Hendersonia sarmentorum* West.: on 5 NS [1138].
- Hericius erinaceus* (Bull. ex Fr.) Pers.: white spongy rot, carie blanche spongieuse: on and from decay of 8 Ont [797].
- H. ramosum* (Bull. ex Mérat) Letellier (*H. laciniatum* Leers ex Banker): white spongy rot, carie blanche spongieuse: from decayed 8 Ont F52:76.
- Herpotrichia pezizula* (Berk. & Curt.) Ell. & Ev. and its conidial state, *Helicoma curtisii* Berk.: on 9 NS [1138].
- Heterochaetella dubia* (Bourd. & Galz.) Bourd. & Galz.: on *A.* sp. Ont [619].
- Hydnum septentrionale* Fr.: on and cause of decay of 8 Ont [797].
- Hymenochaete agglutinans* Ell.: on young *A.* sp. Ont F54:77.
- H. badioferruginea* (Mont.) Lév. and *H. corrugata* (Fr.) Lév.: on branches of *A.* spp. NS [1138].
- H. rubiginosa* (Dicks ex Fr.) Lév.: on 8 Ont [797].
- H. tabacina* Sow. ex Lév.: canker, chancre hyménochétéen: on *A.* spp. NS PEI [1138]; on 3 BC [1198]; on 6 NB NS, 9 NB F53:24.
- Hypocrea rufa* (Pers.) Fr.: on 4 Man [93, p. 46].
- Hypoderma rufilabrum* (Berk. & Curt.) Sacc.: on twigs of 9 Ont F59:66, NS [1138].
- Hypoxyton cohaerens* Pers. ex Fr.: on *A.* sp. Ont F54:76.
- H. deustum* (Hoffm. ex Fr.) Grev. (*H. ustulatum* Bull. ex Fr., *Ustulina vulgaris* Tul.): brittle white heart-rot, carie blanche friable: about stumps of 3 BC [50]; on 4 BC [1198]; from decay of 8 Ont [797]; on 8 NS 50:113.
- H. fragiforme* (Pers. ex Fr.) Kickx (*H. coccineum* Bull. ex Fr.): on *A.* sp. Ont F54:76.
- H. mammatum* Berk. & Curt. (*H. blakei* Berk. & Curt.): on 8 Ont F51:135.
- H. multiforme* Fr.: on *A.* sp. Ont F54:76.
- H. rubiginosum* Pers. ex Fr.: on 4 Ont 33:103; on 9 NS [1138].
- Hysterium pulicare* (Pers.) Fr.: on *A.* sp. NB [1138].
- Irpex mollis* Berk. & Curt.: on 8 Ont [797].
- Lachnum virgineum* (Batsch) Karst.: on *A.* sp. NB [1138].
- Lasiosphaeria hirsuta* (Fr.) Ces. & de Not.: on old wood of 4 Man [93, p. 51].
- Lentinus rudis* Fr.: on 8 Ont [797].

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- Lenzites betulina* (L. ex Fr.) Fr.: on 8 Ont [797].
Libertella acerina West.: on 4 Man [93, p. 130].
Lophiostoma quadrinucleatum Karst.: on branch of 4 Man [93, p. 53].
L. triseptatum Pk.: very common on branches of 4 Man [93, p. 53].
Lycogola flavofuscum (Ehr.) Rost.: on 8 Que F62:50.
Lycoperdon umbrinum Pers.: on 8 Ont [797].
Macrophoma negundinis Ell. & Ev.: on 4 Sask 38:91.
Massaria inquinans (Tode) Ces. & de Not.: dieback, dépérissement massarien: on *A. sp.* Que 39:97; on 6 Ont F59:66; common on 9 NS [1138].
M. vomitoria Berk. & Curt.: on *A. sp.* Que 33:104.
Melanconiopsis inquinans Ell. & Ev.: canker, chancre mélanconiopsien: on 3 BC [1199].
Melanconis everhartii Ell.: on 6, 8 Ont F60:67; on 9 NS [1138].
Melanomma medium Sacc. & Speg.: on *A. sp.* BC [50].
Merulius confluens Schw. and *M. corium* (Pers. ex Fr.): on 3 BC [1198].
M. tremellosus Schrad. ex Fr.: on *A. sp.* NS [1138].
Microdiplodia ?subsecta Allesch.: on twigs of 4 Man [93, p. 134].
Mollisia cinerea (Batsch) Karst.: common on old wood of *A. sp.* Man [93, p. 40].
M. stictella Sacc. & Speg.: on twigs of 9 NS [1138].
Mycena corticola (Fr.) Gray: on 8 Ont [797].
Mycosphaerella punctiformis (Pers. ex Fr.) Starb.: leaf spot, tache des feuilles: on 3 BC [50].
Naematoloma fasciculare (Huds. ex Fr.) Karst.: on 3 BC F59:109.
N. sublateralitium (Fr.) Karst. (*Hypholoma s.* (Fr.) Quél.); at bases of stumps of *A. spp.* NB NS, very common [1138].
Nectria cinnabarina Tode ex Fr. (*Creonectria purpurea* (L.) Seaver; stat. conid. *Tubercularia vulgaris* Tode): dieback and coral spot, dépérissement: on *A. sp.* Nfld 55:115; on twigs and branches of 3 BC [50, 1199], F57:86; on 4 Alta 33:62, Man common [93, p. 46], NB F53:24; on 5 NS 36:68; on 6 PEI 33:62; on 7 NS 51:104; on 10 Ont 28:90; on 11 NS 52:101. Very common on dead twigs of many hosts. As Wehmeyer [1138] remarks, "The collections listed here under this name no doubt represent a mixed species."
N. coccinea Pers. ex Fr. (*Creonectria c.* (Pers.) Seaver): on *A. spp.* BC [50]; on 1, 3 BC [1198].
N. coccinea var. *faginata* Lohm., Wats. & Ayers: canker, chancre: on cordwood and standing trees of *A. sp.* NS 34:74, [1138].
N. galligena Bres.: target canker, chancre nectrien: on *A. sp.* Ont F54:76; frequently observed on *A. sp.* Que. F60:44; probably more abundant than these records suggest.
N. mammoidea Phil. & Plowr. (*Creonectria m.* (Phil & Plowr.) Seaver): on bark of *A. sp.* BC [50].
N. modesta Höhn.: on *A. sp.* Ont F62:70.
N. peziza Tode ex Fr.: on 4 Ont 33:103.
Odontia arguta (Fr.) Quél. [*Hyphodontia a.* (Fr.) John Erikss.]: on old 4 Man [93, p. 80].
O. crustosa (Fr.) Quél.: on 8 Ont [797]; see *Abies*.
O. fimbriata (Fr.) Quél. [*Steccherinum fimbriatum* (Pers. ex Fr.) John Erikss.]: on 3 BC [1198]; on 8 Ont [797].
O. subabrupta Bourd. & Galz.: on 3 BC [1198].
O. uda (Fr.) Bres.: on 3 BC [1198]; sporophore on *A. sp.* Ont; for culture characters see Nobles et al. [795].
Ophiocordyceps clavulata (Schw.) Petch: on [?scale insects] on *A. sp.* Ont F58:59.
Othia hypoxylon (Ell. & Ev.) Shear: on old wood of 4 Man [93, p. 80].
Panus laevis Berk. & Curt.: on *A. sp.* NS [1138].
P. rudis Fr.: on dead *A. sp.* NS [1138].
P. stypticus (Bull. ex Fr.) Fr.: on 8 Ont [797]. Sporophores on *A. spp.*, Que, and other broad-leaved trees, Ont Que; a heterothallic and tetrapolar species. When American (luminous) and European (nonluminous) isolates were paired, the isolates were interfertile; luminosity, governed by a single gene, is dominant over nonluminosity in the dikaryotic mycelium and in the sporophore of the F_1 generation [669].
Papularia arundinis (Cda.) Fr.: from seed of *A. sp.* China [374].
Pellicularia flavescens (Bon.) Rogers (*Corticium fenestratum* Overh.): on old 4 Man [93, p. 76].
P. pruinata (Bres.) Rogers [*Botryobasidium pruinatum* (Bres.) John Erikss.]: on 3 BC [1198].
P. vaga (Berk. & Curt.) Rogers: on 1 BC [1198]; see *Abies*.
Peniophora affinis Burt: on *A. spp.* NS [1138]; on 8 Ont [797].
P. aspera (Pers.) Sacc. (*P. setigera* (Fr.) Höhn. & Litsch., *Odontia s.* (Fr.) L. W. Miller): on *A. sp.* NS [1138]; on 3 BC [1198]; on 74 Man [93, p. 80]; on 8 Ont [797]; see *Abies*.
P. cinerea (Fr.) Cke.: on *A. sp.* NS [1138]; on 8 Ont [797].
P. crenea (Bres.) Sacc. & Syd. and *P. decorticans* Burt: on 3 BC [1198].
P. gracillima Ell. & Ev.: on *A. sp.* NS [1138]; see *Abies*.
P. guttulifera (Karst.) Sacc. [*Hyphoderma guttuliferum* (Karst.) Donk]: on old 4 Man [93, p. 78].
P. heterocystidia Burt [*Hyphoderma heterocystidium* (Burt) Donk]: on 8 Ont [797], Que [705].
P. hydnoidea Cke. & Massee: on 8 Ont [797].
P. incarnata (Pers. ex Fr.) Karst.: on *A. sp.* NS [1138]; on 3 BC [1198].
P. longispora (Pat.) Höhn.: on 4 Man [93, p. 78].
P. ludoviciana Burt: on 8 Ont [797].
P. mutata (Pk.) Höhn. & Litsch. (*P. allescheri* (Bres.) Sacc. & Syd. [*Hyphoderma mutatum* (Pk.) Donk]): on *A. spp.* Ont Que [705]; on 8 Ont [797].
P. pithya John Erikss.: recorded on 3 BC [1198].
P. rimicola (Karst.) Höhn. & Litsch. [*Xenasma rimicola* (Karst.) Donk]: on *A. sp.* Ont, 3 BC [497].
P. sambuci (Pers. ex Pers.) Burt [*Hyphodontia s.* (Pers. ex Pers.) John Erikss.]: on 8 Ont [797].
P. sanguinea (Fr.) Höhn. & Litsch.: on 8 Ont [797].
Periconia pycnospora Fres.: from seeds of *A. sp.* China [374].
Pezicula acericola (Pk.) Sacc.: on 5, 6 Ont [364]; on 8 NS [1138]; on 9 Ont NB [364], NS [1138].
P. carnea (Cke. & Pk.) Rehm: dieback, dépérissement péziculéen: on 6 Que [367], associated with cankers NB F57:25.
P. spicata Ell. & Ev.: on dead twigs of 9 Ont [979, p. 344]. From a macroscopic examination of a fragment of the type in the Durand Herb., Groves (in litt.) concluded that the fungus is doubtfully a *Pezicula*.
P. subcarnea Groves: on 5 Ont Que [367, p. 519].
Phialocephala canadensis W. B. Kendr.: on wood of *A. sp.* type Que [554, p. 1018].
P. fusca W. B. Kendr.: on wood of *A. sp.* Que [554].

- Phlebia radiata* Fr. (*P. merismoides* Fr.): on *A. sp.* Ont [795]; on 3 BC [1199]; a heterothallic and bipolar species [795].
- Phleospora aceris* (Lib.) Sacc. (*Septoria a.* (Lib.) Berk. & Br., *P. canadensis* Bubák & Dearn., *Septoria acerina* Pk., *Cylindrosporium a.* (Pk.) Dearn., *C. consociatum* Dearn., *C. pennsylvanicum* Ell. & Ev., *Septoria circinata* Pk., *Phyllosticta minutissima* Ell. & Ev.): small leaf spot, tache petite des feuilles: on 1, 2 BC [1198]; on 2 Alaska [175], Alta 34:94; on 5 Ont 33:103, Que 43:94, NB [1138], NS 44:98, PEI 34:73; on 6 Que 43:94, NB F53:25, NS 52:101; on 8 NS 52:101; on 9 Man [93, p. 134], Que 43:94, NB 47:99, Nfld F53:25; on 11 NS 52:101. A common disease of maples but rarely occurring on 8.
- Pholiota adiposa* (Fr.) Kummer: brown mottled rot, carie brune madrée: causes a rot of heartwood of living broad-leaved trees or, more rarely, coniferous trees. On and a common cause of decay of 8 Ont [797]; for culture studies see Nobles [791]. According to Groves [375], the fungus here called *P. adiposa* is *P. aurivella* (Batsch ex Fr.) Kummer.
- P. albocrenulata* Pk.: on 4 Man [93, p. 104]; on 8 Ont [797].
- P. spectabilis* (Fr.) Gill.: brown mottled rot, carie brune madrée: on logs of 4 Man [93, p. 105]; isolated from decayed 8 Ont F52:76.
- Phoma aceris-negundinis* Arcang.: on 4 PEI 26:31.
- P. fumosa* Ell. & Ev.: on twigs of 4 Man [93, p. 134].
- P. ?negundinicola* Thüm.: on samarae of 4 Man [93].
- Phyllactinia guttata* (Fr.) Lév. (*P. corylea* (Pers.) Karst.): powdery mildew, blanc: on 6 Que 44:98.
- Phyllosticta minima* (Berk. & Curt.) Underw. & Earle, (*P. acericola* Ell. & Ev.): leaf spot, tache des feuilles: on 6 Que 33:103, 43:94; on 7 Que 32:98, 43:94; on 9 Man [93, p. 135], NS [1138], PEI 34:74; on 10 ?Ont 27:90; reported on 8 but apparently referable to *Gloeosporium apocryptum* (q.v.).
- P. minutissima* Ell. & Ev.: leaf spot, tache des feuilles: on 8, 9 Que 43:94. The infection was of such a character to suggest that the organism may be more than the microconidial stage of *Phleospora aceris* (q.v.), 45:101.
- P. negundinis* Sacc. & Speg.: leaf spot, tache des feuilles: on 4 Man [93]; often closely associated with *Septoria negundinis* (q.v.).
- Phyllotopsis nidulans* (Pers. ex Fr.) Singer (*Claudopus n.* (Pers. ex Fr.) Karst.): on 8 Ont [797].
- Physalacria inflata* (Schw.) Pk.: on 8 Ont [797].
- Piggotia negundinis* Ell. & Dearn.: leaf spot, tache des feuilles: on 4 Sask Man [93, p. 136], Que 31:82.
- Pleurotus elongatipes* Pk.: on old logs of 4 Man [93, p. 94].
- P. ostreatus* (Jacq. ex Fr.) Kummer: white spongy rot, carie blanche spongieuse: on 8 Ont [797].
- P. sapidus* Kalchbr.: on living 3 BC F52:152.
- P. ?septicus* Fr.: on old 4 Man [93].
- P. serotinus* (Schrad. ex Fr.) Kummer: white spongy rot, carie blanche spongieuse: on logs of *A. sp.* NS [1138].
- P. ulmarius* (Bull. ex Fr.) Kummer: white spongy rot, carie blanche spongieuse: common on living and dead 4 Man [93]; on 4 Sask F59:80, Ont [791]; on 8 Ont [797]; the fungus in N. America may be *P. tessulatus* (Bull. ex Fr.) Gill. F59:80. Causes a brown rot of broad-leaved trees; for culture studies see Nobles [791].
- Polyporus* spp. (*P. hirsutus*, *P. pubescens*, *P. versicolor* (q.v.) and *P. zonatus*): associated with decay of 8 Ont, but "at present difficult to distinguish these fungi in culture," [797].
- P. adustus* Willd. ex Fr.: white mottled rot, carie blanche madrée: on 8 Ont [797].
- P. albellus* Pk.: on 8 Ont [797], NS [1138].
- P. berkleyi* Fr.: on 3 BC [1198].
- P. bififormis* Klotsch ex Fr.: on 8 Ont [797].
- P. caesius* Schrad. ex Fr.: on *A. sp.* NS [1138]; on 3 BC [1198].
- P. cuticularis* Bull. ex Fr.: causes a white stringy rot of broad-leaved trees; on 8 Ont [797]; for culture studies see Nobles [791].
- P. delectans* Pk.: on ?8 Que [810], Ont [668].
- P. dichrous* Fr.: on 8 Ont [797].
- P. elegans* Bull. ex Fr.: on dead 4 Man [93, p. 82]; on 8 Ont [797].
- P. gilvus* (Schw.) Fr.: on dead 4 Man [93]; on 8 Ont [797].
- P. glomeratus* Pk.: white spongy rot, carie blanche spongieuse: causes a rot and canker of broad-leaved trees: on logs of *A. sp.* NS [1138]; on *A. sp.* Ont, 6 Que [791]; on and commonly isolated from decay of 8 Ont [797]; cultures studied by Nobles [791]. Histological changes brought about by the fungus in 8 Ont described by Good & Nelson [329].
- P. hirsutulus* Schw.: on 5 NS [1138].
- P. hirsutus* Wulf. ex Fr.: white spongy rot, carie blanche spongieuse: on *A. sp.* NS F32:26; on 2 BC [1198]; on 8 Ont [797]. Ten monosporous cultures from a sporophore on *A. sp.* Que apparently exhibited bipolar fertility whereas other sets were mostly tetrapolar [795].
- P. nidulans* Fr. (*P. rutilans* Pers. ex Fr.): on 8 Ont [797].
- P. obtusus* Berk.: white spongy rot, carie blanche spongieuse: rare on 8 Ont F53:85.
- P. pargamenus* Fr.: white spongy rot, carie blanche spongieuse: on *A. sp.* NS [1138]; from decayed 8 Ont F55:26.
- P. picipes* Fr.: on 3 BC [1198]; common on decayed or buried wood NS [1138].
- P. pubescens* Schum. ex Fr.: on 8 Ont [797].
- P. radiatus* Sow. ex Fr.: on *A. sp.* NS [1138]; on 8 Ont [797]; on 9 Que, causes a white rot of broad-leaved trees, for cultures see Nobles [791].
- P. resinosis* Schrad. ex Fr.: brown cubical rot, carie brune cubique: on logs of ?4 Man [93, p. 83]; on 8 Ont [797].
- P. semipileatus* Pk.: on 3 BC [1198].
- P. spumeus* Sow. ex Fr.: on 8 Ont [797].
- P. tulipiferae* (Schw.) Overh.: white spongy rot, carie blanche spongieuse: on 4 Man [93, p. 84]; on 8 Ont [797].
- P. varius* Fr.: on *A. sp.* NS [1138]; on 8 Ont [797].
- P. velutinus* Fr.: on 8 Ont [797].
- P. versicolor* L. ex Fr.: white spongy rot, carie blanche spongieuse: on 3 BC [1198].
- Poria ambigua* Bres.: on 8 Ont [797].
- P. candidissima* (Schw.) Cke.: on 8 Ont [797]; see *Abies*.
- P. corticola* (Fr.) Cke. and *P. eupora* (Karst.) Cke.: on 8 Ont [797].
- P. ferrea* (Pers.) Bourd. & Galz.: white spongy rot, carie blanche spongieuse: on *A. sp.* Nfld F53:26; on 3 BC [1198]; on 5, 8 NB [1138].
- P. ferruginosa* (Schrad. ex Fr.) Karst.: white spongy rot, carie blanche spongieuse: on dead 4 Man [93]; on 5 NB [1138]; on 8 Ont [797].
- P. punctata* (Fr.) Karst.: white spongy rot, carie blanche spongieuse: on *A. sp.* Ont, isolate used in culture studies [791]; on 5 NB [1138]; on 8 Ont [797].

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- Poria reticulata* (Pers. ex Fr.) Cke.: on 3 BC F62:122.
- P. versipora* (Pers.) Rom.: on 3 BC [1198].
- Prosthecium innesii* (Curr.) Wehm.: on 9 Ont F59:66; on 11 NS 53:104.
- Protoventuria vancouverensis* Dearn.: on dead bark of *A. sp.* BC [50].
- Pseudovalsa stylospora* Ell. & Ev.: fairly common on 8, 9 NS [1138].
- Pycnoporus cinnabarinus* (Jacq. ex Fr.) Karst. (*Pycnoporus c.* Jacq. ex Fr.): on *A. sp.*, 6 Ont [794]; on 6 Ont F53:25; on 8 Ont [797].
- Radulum orbiculare* Fr.: on 8, 9 NS [1138].
- R. spathulatum* (Fr.) Bres.: on old 4 Man [93, p. 80].
- Ramularia lethalis* Ell. & Ev.: on 6 Que 47:99; on 9 NS 52:101, following *Taphrina dearnessii* (q.v.).
- Rhytisma acerinum* (Pers.) Fr.: tar spot, tache goudronneuse: commonly recorded on 6 Que 33:104, NS [1138], PEI 38:91; on 7 Man [93, p. 42], Ont 53:104, Que 31:83, NB NS 32:83; recorded also on 4 NB 26:31; on 7a NS 40:86; on 8 Ont 53:104, Que 32:98, PEI 33:62; on 9 PEI 42:92; on 12 Alta 48:96, Man [93]. When affected leaves of 7, 8 collected in Ont in the fall of 1952 were placed outside to overwinter, mature ascospores were present in the fruit bodies on 5 May 1953 as the new leaves were beginning to unfold on the respective trees species, 53:104.
- R. punctatum* (Pers.) Fr.: speckled tar spot: tache goudronneuse ponctuée: commonly recorded on 3 BC 49:96; on 5 Que 32:98, NS 51:104; on 9 Man [93, p. 42], NB 42:92, NS [1138]; also recorded on 4 NS 52:101; on 6 NB 50:113; on 7 NS 51:104; on 11 Que 24:50.
- Rosellinia mammiformis* (Pers.) Sacc.: on ?4 Man [93, p. 51].
- Rutstroemia setulata* (Dearn. & House) White: on 9 Ont F60:67.
- Schizophyllum commune* Fr.: white spongy rot, carie blanche spongieuse: on 3 BC F58:103, [1203]; on 8 Ont [797].
- Schizoxylon compositum* Ell. & Ev.: on branches of 4 Man [93, p. 42].
- Sebacina epigaea* (Berk. & Br.) Bourd. & Galz.: on bark of *A. sp.* NS [1138].
- Septomyxa tulasnei* Höhn.: on 4 NS F61:42.
- Septoria negundinis* Ell. & Ev.: leaf spot, tache des feuilles: on 4 Sask Man [93, p. 139], Ont 25:65, Que 31:82.
- Solenia ochracea* Hoff. ex Fr.: on 3 BC [1198].
- Sphaeronema acerinum* Pk., stat. conid. of *Dermea acerina* (q.v.): dieback, dépérissement: on 6 Que 33:104, NB F57:27, NS [1138].
- Sphaeropsis albescens* Ell. & Ev.: dieback, dépérissement sphéropsien: on 4 Alta 33:103, Sask 28:61, Man [93, p. 140], ?PEI 26:31.
- S. clintonii* Pk.: on 9 Ont F60:67.
- Steccherinum ochraceum* (Fr.) S. F. Gray: on 3 BC [1198].
- S. septentrionale* (Fr.) Banker: white spongy rot, carie blanche spongieuse: on *A. sp.* Ont F62:71; on 4 Man [93, p. 81].
- Steganosporium pyriforme* (Hoffm. ex Fr.) Cda.: canker, chancre stéganosporien: on 8 Ont Que 33:104, NS [1138]; probably this species rather than *S. acerinum* Pk., [see 1138].
- Stereum cinerascens* (Schw.) Masee [*Lloydella c.* (Schw.) Bres.]: on *A. sp.* Sask, on old 4 Man [93, p. 78]; on 8 Ont [797].
- S. complicatum* (Fr.) Fr. (*S. rameale* (Schw.) Burt): on 8 Ont [797].
- S. hirsutum* (Willd. ex Fr.) S. F. Gray: on 8 Ont [797].
- S. murrayi* (Berk. & Curt.) Burt: white spongy rot, carie blanche spongieuse: on *A. sp.* NB NS [1138].
- S. ochraceoflavum* (Schw.) Ell.: on 3 BC [1198].
- S. ostrea* Blume & Nees ex Fr. (*S. fasciatum* (Schw.) Fr.): on 8 Ont [797].
- S. purpureum* Fr.: silver leaf, plomb: from *A. sp.* BC [1198]; on 8 Ont [797], NS [1138].
- S. roseocarneum* (Schw.) Fr. [*Laeticorticium r.* (Schw.) Boidon]: on 8 Ont [797].
- Stictis radiata* L. ex Pers.: on 8, 9 NS; common on dead wood and bark [1138].
- Stigmata negundinis* (Berk. & Curt.) M. B. Ellis [278, p. 44] (*Coryneum n.* Berk. & Curt., apud Berk., *C. septosporioides* Sacc. & Syd.): twig blight or canker, brûlure des rameaux: on 4 Alta 33:103, Sask 38:91, 42:92, Man DAOM 56762, Ont 23:111, NB F56:26, 57:116, PEI 26:31.
- Strickeria obducens* (Fr.) Wint.: on *A. sp.* BC [50].
- Taphrina carveri* Jenkins: on 7 Ont [501].
- T. darkeri* Mix: on 2 BC F60:110.
- T. dearnessii* Jenkins: leaf blister, cloque des feuilles: on 6 Ont [501], Que 47:99, F58:37, [735], NS F53:26; see also 37:69.
- T. letifera* (Pk.) Sacc.: on 5 NS F56:26.
- Teichospora clavispora* Ell. & Ev.: on dead branches of 4 Man [93, p. 52].
- Tomentella tristis* (Karst.) Höhn. & Litsch. (*Hypochnus umbrinus* (Fr.) Quél.): on old 4 Man [93, p. 77].
- Trametes hispida* Bagl.: white ring rot, carie blanche annelée: on living 4 Alta F54:112.
- T. mollis* (Summerf.) Fr.: on 3 BC [1198]; on 8 Ont [797].
- Trogia crispa* Fr.: on 8 Ont [797].
- Tubercularia vulgaris* Tode, stat. conid. of *Nectria cinnabarina* (q.v.): on 3 BC [1198]; on 4 Alta 33:103, Man [93, p. 128], Sask 38:91, NB [1138].
- Tympanis acericola* Groves: on *A. sp.* Que [372]; on 9 NS [372, p. 631; 1138].
- Uncinula bicornis* (Fr.) Lév. (*U. aceris* (DC.) Sacc.): powdery mildew, blanc: on 3 BC 39:97, 42:101, [50].
- U. circinata* Cke. & Pk.: powdery mildew, blanc: on *A. sp.* BC [50]; on 6 NS [1138]; on 7 Que 32:98; on 8 Que 36:68; on 9 Man Ont [93, p. 45], Que 31:82.
- Valsa etherialis* Ell. & Ev.: on 8 NS, fairly common [1138].
- Vararia effusca* (Cke. & Ell.) Rogers & Jackson and *V. investiens* (Schw.) Karst.: on 8 Ont [797].
- Verticillium sp.*: wilt, flétrissure: recorded on 6 NB 28:89, PEI 50:113; on 7 Ont 37:70; on 8 Ont 23:111, Que 24:50, NB 28:89; on 10 Ont 30:80, Que 24:50, PEI 40:86; on 11 Ont 44:98. Symptoms of wilting, which result in the defoliation and often in the death of branches or whole trees, especially in dry seasons, have been reported, 25:50. To what extent the condition is caused by infection with *Verticillium* is unknown.
- V. dahliae* Kleb.: from *A. sp.* BC [1198].
- Volvariella bombycina* (Pers. ex Fr.) Singer (*Volvaria b.* Fr.): on 8 Ont [797].
- Xylaria sp.*: on 1 BC [1198].
- Chemical injury: injury from drifting sprays of 2,4-D on 4, first noted in Sask in 1949, 50:113, reached a peak about 1952, but later declined, 55:111; also recorded in Alta Man F51:142, southern Ont

F54:77. Observations suggested a carry-over effect into the year after application.

Excessive transpiration: leaf scorch as a result of excessive transpiration has been noted in Ont and Que, particularly on 8. Injury is most pronounced in a dry season, 25:50.

Late spring frosts: may sometimes cause slight to severe injury to the young foliage Sask 42:92, Que 30:80.

Winter injury: the winter of 1933-34 caused slight injury to 10 and extensive damage to 11 at Ottawa, Ont 33:77.

Achillea L. COMPOSITAE

Perennial herbs or seldom subshrubs of the north temperate zone, a few cult. for their ornamental flowers and foliage; others are weeds.

1. *A. borealis* Bong., northern yarrow, herbe à dindes; an arctic-alpine species of the north temperate zone.
2. *A. lanulosa* Nutt., woolly yarrow, achillée laineuse; a native species; in Canada from BC to Nfld.
3. *A. millefolium* L., common yarrow or milfoil, achillée millefeuille ou herbe à dindes; a very common weed in Canada.
4. *A. ptarmica* L., sneezewort, herbe éternuer; naturalized from Europe and contains cult. forms.
5. *A. sibirica* Ledeb. (*A. multiflora* Hook.); occurs from Que to Man, and in Sask and Alaska; also in Siberia.

Ceratobasidium anceps (Bres. & Syd.) Jackson: on 3 Ont [495].

Diaporthe arctii (Lasch) Nit. var. *achilleae* (Auersw.) Wehm.: on 3 NS [1138].

Eutyloma compositarum Farl. (*E. ?achillae* Magn.): leaf smut, charbon des feuilles: on 3 Man [93, p. 60; 292, p. 83; 946, p. 112].

Erysiphe polygoni DC. ex Mérat: on 1 Alaska [175].

Leptosphaeria doliolum (Pers.) Ces. & de Not.: on 3 Que [53].

L. millefolii (Fckl.) Niessl: on 3 NS [1138].

Leptostroma herbarum (Fr.) Lk.: on 3 Greenl [900].

Mycosphaerella minor (Karst.) Johans.: on 1 Labr [52].

M. tassiana (de Not.) Johans.: on *A. spp.* BC [50].

Ophiobolus erythrosporus (Reiss) Wint.: on *A. sp.* Que [53].

Pleospora helvetica Niessl: on 1 Labr [52].

P. herbarum (Fr.) Rabh. var. *occidentalis* Wehm.: on 3 BC [50].

P. megalotheca Tracy & Earle nom. dub. [1141, p. 306]: on 3, "accompanied by the *Alternaria* stage," Man [93, p. 55]; in this instance the fungus may be *P. herbarum*.

P. rainierensis Wehm. (*P. asymmetrica* Wehm.): on 2 BC [50].

P. scrophulariae (Desm.) Höhn.: on 1 Labr [52].

Puccinia millefolii Fckl. (*P. ptarmicae* Karst.): rust, rouille: III on 1 Alaska [15, p. 206; 175]; on 3 Sask Man [93, p. 69]; on wild plants of 4 and the cult.

form, The Pearl, Que 46:81, 49:100; on 5 Alaska [175], Alta [15], [cf. 828].

Venturia centaureae Arx: on 1 Labr [52].

V. fimbriata Dearn. & House: on 3 Que [53].

Achlys DC. BERBERIDACEAE

1. *A. triphylla* (Smith) DC., may-leaves, achlys à trois feuilles; small perennial herb, native to the Pacific coast and grown in rock gardens.

Stagonospora achlydis (Dearn.) Sprague (*Ascochyta a.* Dearn.): leaf spot, tache des feuilles: common on 1 Vancouver I., BC [535].

Aconitum L. RANUNCULACEAE

Showy herbaceous herbs of the northern hemisphere, grown for ornament or, mainly in Europe, for the alkaloid aconite.

1. *A. bicolor* Schult.; native to Europe, cult.
2. *A. napellus* L., garden monkshood or aconite, casque bleu; native to Europe, cult. and escaped.

Other hosts: 3, *A. delphinifolium* DC. 4, *A. maximum* Pall.

Aecidium circinans Erikss. f. *aconiti-delphinii*: on *A. sp.* Alaska; identity doubtful, possibly *Puccinia recondita* (q.v.) [175].

Low temperature basidiomycete, basidiomycète frigophile: isolated from naturally infected *A. sp.* Alta [215].

Erysiphe polygoni DC. ex Mérat: powdery mildew, blanc: on 1 Indian Head, Sask 41:87.

Mycosphaerella tassiana (de Not.) Johans. (*M. pachyasca* (Rostr.) Vesterg.): on 3 Yukon [600].

Pleospora comata Auerw. & Niessl (*Pyrenophora c.* (Niessl) Sacc.): on 3 Yukon [600].

Pseudomonas delphinii (E.F.Sm.) Stapp: bacterial blight, tache bactérienne: on 1 Brandon, Man 38:96.

Puccinia recondita Rob. ex Desm. (*P. rubigo-vera* Wint.): on 3 Alaska [15, p. 178; 175]; on 4 Alaska [175].

Urocystis sorosporioides Körn.: heavy on 3 BC [957].

Aster yellows virus (callistephus virus 1): aster yellows, jaunisse de l'aster: common on ?1 Fredericton, NB; affected plants severely injured, 45:107 et seq.

Acorus L. ARACEAE

Two paludous species of the northern hemisphere, planted in bog gardens.

1. *A. calamus* L., sweet flag, belle-angélique; known to be a native of N. America.

Burrillia acori Dearn.: host shown to be *Sparganium* (q.v.), not *Acorus* [see 957].

Uromyces sparganii Cke. & Pk. ssp. *sparganii* (*U. pyri-formis* Cke.): II III on 1 Ont [15, p. 125], Que [831], NS [138], [cf. 828].

Actaea L.

RANUNCULACEAE

Erect perennial herbs of the northern hemisphere.

1. *A. pachypoda* Ell., white baneberry, actée à gros pédicelles; native to the eastern half of Canada and the US.
2. *A. rubra* (Ait.) Willd., red baneberry, poison de couleuvre; native to Canada and into the northern half of the US. 2a, *A. rubra* ssp. *arguta* (Nutt.) Hult. (*A. arguta* Nutt.); from Alaska to Calif and Ariz. 2b, *A. rubra* f. *neglecta* (Gillm.) Robins. (*A. eburnea* Rydb.); range similar to the species.

Puccinia recondita Rob. ex Desm. (*P. clematidis* Lagerh., *P. rubigo-vera* Wint.): 0 I on 1 Man 24:77, Ont (misspelled *A. brachypoda*) [15, p. 180]; on 2 Man 24:77, Que 32:98; on 2a, 2b Alaska [175], [cf. 828].

Ramularia actaeae Ell. & Holw.: on leaves of *A.* sp. Sask, on 1, 2, 2b Man [93, p. 124]; on 2 Alaska [983, 1038].

Urocystis carcinodes (Berk. & Curt.) Fisch. v. Waldh.: on 2a Alaska [175].

Adiantum L.

POLYPODIACEAE

Thin-leaved ferns mainly of tropical America or other warm regions and a few native to temperate N. America.

1. *A. pedatum* L., American maidenhair, capillaire du Canada, and its varieties occur across Canada and into Alaska and n.e. Asia.

Ceratobasidium anceps (Bres. & Syd.) Jackson: on 1 Que [495].

Adoxa L.

ADOXACEAE

A monotypic genus of the temperate part of the northern hemisphere.

1. *A. moschatellina* L., musk-root, musquette; perennial herb of northern and alpine regions, sometimes grown in rock gardens.

Puccinia adoxae Hedw.f. ex DC.: III on 1 Edmonton, Alta [739], Alaska [175].

P. argentata (Schultz) Wint.: 0 I on 1 Edmonton, Alta [739].

Aegilops L.

GRAMINEAE

Annual grasses, native to southern Europe and western Asia.

1. *A. cylindrica* Host; locally naturalized from southern Europe and becoming a serious weed in some parts of the US.
2. *A. squarrosa* L.; central Asia.

Fusarium equiseti (Cda.) Sacc.: from diseased basal parts of *A.* hybrid plants in greenhouse Man [335].

Puccinia recondita Rob. ex Desm. (*P. triticina* Erikss.): leaf rust, rouille des feuilles: on 2 Lethbridge, Alta, and Winnipeg, Man 41:39.

P. striiformis West. (*P. glumarum* Erikss. & Henn.): stripe rust, rouille en rayures: on 1 cult., Sask. [93, p. 68]; as form 13, Saskatoon, Sask [770, p. 100].

Aesculus L.

HIPPOCASTANACEAE

Trees or shrubs of the northern hemisphere; several species native to the US; cult. for shade.

1. *A. glabra* Willd., Ohio buckeye, marronnier à fleurs rouges; often cult.
2. *A. hippocastanum* L., horsechestnut, marronnier d'Inde; one of the most showy flowering trees and often planted as a street tree; native to southern Europe.

Collybia velutipes (Curt. ex Fr.) Kummer: white spongy rot, carie blanche spongieuse: cause of wound rot of 2 PEI 52:101.

Guignardia aesculi V. B. Stewart (stat. conid. *Phyllosticta paviae* Desm., *P. sphaeropsidea* Ell. & Ev.): leaf blotch, brûlure des feuilles: on 2 Ont 24:77, F56:58, Que 32:83, NB PEI 29:61, NS 24:77, Nfld F52:19; in NS in 1919 [1138]. In some years causes severe defoliation wherever the tree is planted, ruining the beauty of the trees, 37:68, 48:96. It may possibly weaken them, leading to their final destruction by wood-destroying fungi, 49:94. The disease is easily controlled by two spray applications of ferbam, 44:121; the perfect state seems not to have been observed in Canada.

Hypoxylon deustum (Hoffm. ex Fr.) Grev. (*Ustulina vulgaris* Tul.): on 2 NS F53:27.

Nectria cinnabarina Tode ex Fr. (*Creonectria purpurea* (L.) Seaver; stat. conid. *Tubercularia vulgaris* Tode): twig blight and canker, dépérissement necrien: on 2 BC [1199], F57:85, Ont Que 34:73, NB 35:61, NS [1138], PEI 42:92; what species of *Nectria* cause cankers on this host is still uncertain.

Nectria coccinea (Pers.) Fr. var. *faginata* Lohm., Wats. & Ayers: on *A.* sp. NB [1138].

Polyporus fumosus Pers. ex Fr.: on 2 PEI [1138].

Septoria aesculi Pk.: severe on leaves of 2 Man; on 2 Ont 43:94.

Stereum purpureum Fr.: on 2 BC [1198].

Uncinula flexuosa Pk.: on 2 NS [1138].

Leaf scorch: trees of 1 showed slight scorching after dry weather, Man 45:101.

Agastache Clayt.

LABIATAE

Perennial herbs of N. America and Asia.

1. *A. foeniculum* (Pursh) Ktze. (*A. anethiodora* (Nutt.) Britt.); native to Western Canada and the US; adventive eastward in Que.

Sphaerotheca fuliginea (Schlecht. ex Fr.) Poll. (*S. humuli* (DC.) Burr. var. *f.* (Schlecht.) Salm.): on 1 Man 23:123.

Agave L.

AMARYLLIDACEAE

Robust perennial herbs, mostly of arid warm regions in Mexico and Central America, some also in southern Calif to Texas. In Mexico, several species of great economic importance as a source of fiber, liquor or other products.

1. *A. americana* L., century plant, agave; much grown as a tub plant for placing on porches and lawns in summer.

Botrytis cinerea Pers.: on *A. sp.* Alaska [1038].

Bacterial leaf spot, tache bactérienne: destructive on 1 in greenhouse at Edmonton, Alta 34:92; pathogen not determined.

Ageratum L.

COMPOSITAE

Herbs or shrubs, mostly of tropical America; two annuals cult. for ornament, *A. conyzoides* L. and *A. houstonianum* Mill.

Aster yellows virus (callistephus virus 1): on *A. sp.* NB 30:86; 50% of plants affected, Fredericton, NB 31:90; moderate damage at Winnipeg, Man 57:122.

Agoseris Raf.

COMPOSITAE

Perennial herbs mostly of the prairies and plains of western N. America.

1. *A. aurantiaca* (Hook.) Greene (*A. gracilens* (Gray) Kuntze); in Canada in BC and Alta.
2. *A. glauca* (Pursh) Raf.; in Canada in Alta and Sask.

Entyloma polysporum (Pk.) Farl.: on 2 Man [292].

Mycosphaerella tassiana (de Not.) Johans.: on 1 BC [50].

Puccinia columbiensis Ell. & Ev. (*P. maculosa* Schw. non Röhling): III on 2 Alta [15, p. 203].

P. dioicae P. Magn. (*P. extensicola* Plowr. var. *hieraciata* (Schw.) Arth., *P. patruelis* Arth.): 0 I on *A. sp.* Sask 31:117; on 2 Sask. 34:94.

P. hieracii Mart.: 0 I II III on 2 Sask 24:94, [93, p. 69]; II and III stages are usually collected.

Sphaerotheca fuliginea (Schlecht. ex Fr.) Poll. (*S. humuli* (DC.). Burr. var. *f.* (Schlecht.) Salm.); on *A. spp.* BC [50].

Agrimonia L.

ROSACEAE

Perennial herbs of woods and waste ground, mainly of N. America.

1. *A. eupatoria* L.; an adventive from Europe.
2. *A. gryposepala* Wallr.; in Canada in PEI, NS, Que and BC.
3. *A. striata* Michx.; in Canada in Nfld and from NS to BC.

Other host: 4, *A. pubescens* Wallr.

Apiognomonina guttulata (Starb.) Wehm.: on *A. sp.* NS [1138].

Pucciniastrum agrimoniae (Diet.) Tranz.: rust, rouille: II (III) on 1 Que 25:76; on 2 Alta Man [15, p. 14; 93, p. 63], Que 29:73, NS 27:101, [1138]; on 2, 3 Ont [828]; on 3 Que [197], Alta [15, p. 15]; on 4 Ont [15, p. 15].

Sphaerotheca macularis (Wallr. ex Fr.) Magn. (*S. humuli* (DC.) Burr.): powdery mildew, blanc: on 2 Que 34:94, NS in 1909 [1138]; on 3 Alta 34:94.

Agropyron Gaertn.

GRAMINEAE

Perennials of temperate and cool regions of both the northern and southern hemispheres. Most species furnish forage, a few are important range grasses and may be plentiful enough to produce hay, and some are troublesome weeds. They are very susceptible to ergot, the prevalence of which in range species constitutes a menace to livestock and the occurrence of these grasses about cereal fields may result in an ergoty crop. Important species are:

1. *A. cristatum* (L.) Gaertn., crested wheatgrass, agropyre à crête; forage grass of Eurasia, widely introduced in Western Canada. P. Sarkar (Can. J. Botany 34: 328-345. 1956) has segregated the cultivar Fairway, a diploid ($2n = 14$), as *A. cristatiforme* Sarkar (*A. cristatum* var. *pectinatum*); the species proper is apparently $2n = 28$.
2. *A. dasystachyum* (Hook.) Scribn. (*A. subvillosum* (Hook.) E. Nels.); w. Ont and Man to BC.
3. *A. repens* (L.) Beauv., couchgrass, chiendent; an aggressive weed introduced from Europe, common in agricultural areas across Canada, particularly in the long-settled parts.
4. *A. smithii* Rydb., western wheatgrass or go-back grass, agropyre à tige bleue; native of the s. prairies. 4a, *A. s.* var. *molle* (Scribn. & Smith) Jones (*A. molle* (Scribn. & Smith) Rydb.).
5. *A. trachycaulum* (Lk.) Malte var. *trachycaulum* (*A. pauciflorum* (Schw.) Hitchc., *A. tenerum* Vasey), slender wheatgrass or 'western ryegrass', agropyre élané; Labr, Que and Ont to Alaska; selected strains cult. for pasture and hay.
6. *A. trachycaulum* var. *unilaterale* (Cassidy) Malte (*A. richardsoni* Schrad., *A. subsecundum* (Lk.) Hitchc., *A. caninum* auct. Am. non (L.) Beauv.), bearded wheatgrass; Nfld to Alaska south to Calif.

Other hosts: 7, *A. albicans* Scribn. & Smith. 8, *A. caninum* (L.) Beauv. 9, *A. dagnae* Grossh. 10, *A. desertorum* (Fisch.) Schult. 11, *A. elongatum* Host. 12, *A. glaucum* (Desf.) Roem. & Schult. 13, *A. griffithsii* Scribn. &

Agropyron

Smith ex Piper. 14, *A. inerme* (Scribn. & Smith) Rydb. 15, *A. intermedium* (Host) Beauv. 16, *A. junceum* (L.) Beauv. 17, *A. latiglume* (Scribn. & Smith) Rydb. 18, *A. michnoi* Roshev. 19, *A. obtusiusculum* Lange. 20, *A. pungens* (Pers.) Roem. 21, *A. riparium* Scribn. & Smith. 22, *A. semicostatum* (Steud.) Nees ex Bois. 23, *A. sericeum* Hitchc. 24, *A. sibiricum* (Willd.) Beauv. 25, *A. spicatum* (Pursh) Scribn. & Smith. 26, *A. trichophorum* (Lk.) Richt. 27, *A. triticeum* Gaertn. 28, *A. violaceum* (Hornem.) Lange. 29, *A. yukonensis* Scribn. & Merr.

Acremoniella sp.: on 5 Alaska [1037, 1038].

Acrospermum compressum Tode: on *A. sp.* Man [93, p. 45].

Alternaria tenuis auct. sensu Wiltshire: on 3 Alaska [1038].

Ascochyta sorghi Sacc. (*A. graminicola* Sacc.): leaf spot, tache ascochytiq: on 4 Man 24:77; on 5 Man 45:44; on 17, 25 Alaska [175, 1037].

A. utahensis Sprague: on 3, 5 Alaska [1042].

Bipolaris sorokiniana (Sacc. in Sorok.) Shoem. (*Helminthosporium sativum* Pamm., King & Bakke): foot rot, piétin commun: on 1 Ottawa, Ont 34:25; on 3 Man 24:57; 3, 5 naturally infected in Alta, 1 moderately susceptible when inoculated [815]. Occasionally from seed of 1 grown in Sask Man and from diseased seedlings in greenhouse in soil from central Sask [1015]; on 6 Alta [1034].

Brachycolus tritici Gill: brittle dwarf, nanisme fragile: injury to 1 the result of infestation by western wheat aphid, *B. tritici*, Saskatoon, Sask 36:6, 47:37, 48:33; on plots of perennial wheat, 11 × *Triticum aestivum* var. Chinese, Saskatoon, Sask 48:33.

Cladosporium herbarum Lk.: on 5, 17 Alaska [1038].

Claviceps purpurea (Fr.) Tul: ergot, ergot: very common: on 1 BC 34:25, Alta 30:94, [172], Sask 41:25, Man 24:77, Ont 35:21; on 2 Alta 24:57, 54:52, [172], Sask 23:38, Man [1034]; often reported on 3 in Alta [172], Sask 22:23, Man 23:38, Ont 54:53, Que 23:38, NB [1034], NS where also recorded by McKay in 1913 [1138], PEI 44:35; on 4 Alta 34:95, [172], Sask 22:23, Man 23:38; on 4a Alta 24:57; on 5 Alaska [1037, 1038], Alta 29:24, [172], Sask 27:33, Man 23:38, Que 25:21; on 6 Alta 53:49, [172], Man 23:38; on 7 Alta 55:49, [172]; on 10 in plots Morden, Man 43:37; on 11 × *T. aestivum* var. Chinese, Sask 48:33; on 12 in plots Morden, Man 43:37; on 13 cult. Alta 29:73; on 14 Alta [172]; on 15 Sask [1034]; on 16 cult. Man 43:37; on 18 Sask [1034], Morden, Man 43:37; collected repeatedly in Alta 53:49, 54:52, 55:49; isolates from rye produced infection on 1, 5, 10, 11, 14, 15, 21, 27 [172].

Colletotrichum ?graminicola (Ces.) G. W. Wilson: on 1 Sask [93, p. 129].

Corynebacterium agropyri (O'Gara) Murray, Breed & Burkh. (*Bacterium a.* O'Gara): yellow gum disease, gomme bactérienne: on 6 Innisfail, Alta 33:104.

Ditylenchus radicola (Greef) Filipjev: root-gall nematode: on 4 Radisson, Sask. 1 infected experimentally, 47:37, [cf. 1107].

Drechslera tritici-repentis (Died.) Shoem. (*Helminthosporium t.-r.* Died.): leaf blotch, tache des feuilles: on *A. spp.* Alta Man 57:24, [cf. 993]; on 3 Winkler, Man 43:37; on 6 Alaska [1037].

Epichloë typhina (Pers.) Tul.: on 2, 4 Sask [93, p. 46].
Erysiphe graminis DC. ex Méral: powdery mildew, blanc: on 2 Mack 40:100; on 3 BC 49:37, Alta [1034], Sask Man [93, p. 44], Que 25:21, NS 44:35, PEI 43:37; on 3 Alaska, 5 BC, 6, 29 Yukon [1042]; on 5 Alta 35:23, Man 33:105; on 17, 23 Alaska [175, 1037].

E. graminis f. sp. *agropyri* E. Marchal: unlike ff. spp. *tritici* and *hordei*, f. sp. *agropyri* from 3 gave a type 2-3 infection on Little Club wheat, type 1-2 on Glabron barley and type 0 on rye [182].

Fungi from seed: of 1: *Alternaria consortialis* (Thüm.) Groves & Hughes, Alta; *A. tenuis* auct. sensu Wiltshire, Alta Sask; *Ascochyta agropyrina* (Fairm.) Trott., *Aureobasidium pullulans* (de Bary) Arn., Sask; *Bipolaris sorokiniana* (Sacc. in Sorok.) Shoem., Alta; *Botrytis cinerea* Pers., Sask [374]. *Chaetomium succineum* Ames, Sask [1009]. *Cladosporium cladosporioides* (Fres.) De Vries, *C. malorum* Ruehle, *Epicoccum nigrum* Lk., Sask [374]. *Fusarium acuminatum* Ell. & Ev., Alta Sask; *F. sambucinum* Fckl. var. *coeruleum* Wr., Sask [334]. *Gonatobotrys simplex* Cda., Sask; *Nigrospora sphaerica* (Sacc.) Mason, Alta; *Papularia arundinis* (Cda.) Fr., Sask; *Periconia pycnospora* Fres., Alta; *Rhizopus oryzae* Went. & Pr. Geerlings, *Rosellinia limoniiformis* Ell. & Ev., *Selenophoma bromigena* (Sacc.) Sprague & Johnson, *S. donacis* (Pass.) Sprague & Johnson, *Septoria agropyrina* Lobik, *Stagonospora arenaria* Sacc., *Trichoderma viride* Pers. ex Fr., Alta [374]. Of 5: *F. culmorum* (W.G.Sm.) Sacc., Man [334].

Fusarium spp.: from plant parts of 1, 5, *F. acuminatum*, Sask; of 4, 5, *F. equiseti* (Cda.) Sacc., Sask; of 4, *F. semitectum* Berk. & Rav., Man; of 5, *F. sporotrichioides* Sherb., Sask [335]; from leaves of 4, *F. dimerum* Penz., Man 45:41. Pathogenic strains of *F. culmorum* were frequently isolated from diseased seedlings of 1 grown in greenhouse in soil from central Sask [1015]; *F. nivale* (Fr.) Ces. on 17 Yukon [1042].

Hendersonia agropyri Rostr.: on 28 Greenl [899, p. 571].

H. rostrupii Lind [603] (*H. crastophila* sensu Rostr.): on 28 Greenl [899].

Heterosporium avenae Oud.: on 1 Sask [1034].

H. phlei Gregory: on 5, 18 Alaska [175, 1037].

Lagenia radicola Vanterpool & Ledingham: on 3 Vine-land Station, Ont 32:98, [1034].

Leptosphaeria anisomeres Wehm.: on 3 NS [1138].

L. culmifraga Ces. & de Not.: on 25 BC [50].

L. herpotrichoides de Not.: on 3 NS [1138].

Lophodermium arundinaceum (Fr.) Chev.: on 5 Alaska [1038]; on 28 Greenl [899, 900].

Low-temperature basidiomycete, basidiomycète frigidophile: snow mold, moisissure nivale: on 1 Alta 46:29. Rarely found on 1 and 5, but often isolated from 3 Alta [215].

Mollisia sp.: on 5 Alaska [1038].

Mycosphaerella recutita (Fr.) Johans. (*Sphaerella r.* (Fr.) Fckl.): on 28 Greenl [900].

M. tassiana (de Not.) Johans. (*Sphaerella t.* de Not.): on *A. spp.* BC [50]; on 25 Alaska [175]; on 28 Greenl [899].

M. tulasnei (Jancz.) Lindau: on 3, 5 Alaska [1038].

Nigrospora sphaerica (Sacc.) Mason: on 5 Man [93, p. 122].

Olpidium brassicae (Woron.) Dang.: on 5 Sask [1034].

Ophiobolus graminis Sacc.: take-all, piétin-échaudage: 3, 5 heavily attacked under natural conditions in Alta; 1 also highly susceptible when inoculated arti-

- ficially [815]. According to Russell, 1 to 6 were susceptible in inoculation experiments [93, p. 55]; on 5 Alaska [1037].
- Passalora graminis* (Fckl.) Höhn. (*Scolecotrichum* g. Fckl.): brown stripe, strie brune: on 3 Alaska [1037], BC [1034], Man [93, p. 126]; on 5 Alaska [175, 1037], Alta 33:19, Man [93]; on 6 Yukon [1042], Alta [1034]; on 17, 23 Alaska [175, 1037].
- Phoma graminis* West.: on 28 Greenl [899].
- Phyllachora graminis* (Pers. ex. Fr.) Fckl.: tar spot, rayure goudronneuse: on 1 NS [805]; on 3 Alta Ont [805], Man Ont [1034], Que 24:57, NS [1138], PEI 25:21; on 5 Man [93, p. 47], NS [956].
- Physoderma graminis* (Büsgen) de Wild.: on 3 Ottawa, Ont 43:33.
- Platyspora pentamera* (Karst.) Wehm. (*Clathrospora* p. (Karst.) Berl., *Pleospora* p. Karst.): on 17 BC [50]; on 28 Greenl [899].
- Pleospora helvetica* Niessl: on 5 BC [50].
- P. herbarum* (Fr.) Rabh.: on 28 Greenl [899].
- Polymyxa graminis* Ledingham: on 3 Lincoln County, Ont 32:98, [1034].
- Pseudomonas atrofaciens* (McCull.) F.L.Stev.: on *A. × Triticum*, cult., Lacombe, Alta 48:34.
- Puccinia coronata* Cda.: crown rust: rouille couronnée: on 1 NS [1138]; on 3 Man 44:37, Ont [828]; on 4 Sask [15, p. 153]; on 5 Sask [15], Man 44:37.
- P. coronata* f. sp. *secalis* Peturson: 1, 3, 6, 10, 11, 16, 26 were susceptible upon artificial inoculation [845, p. 43]; *A. sp.* infected from aecia (as *P. c.* var. *bromi*) collected on *Rhamnus cathartica* in Eastern Canada, 48:15. Telia from leaves of 3 Man were induced to germinate and the chromosome number was found to be $n = 3$ [688]; probably this special form is not distinct from *P. coronifera* Kleb. f. sp. *agropyri* Erikss.
- P. graminis* Pers.: stem rust, rouille de la tige: on 1 Sask 35:21, Man 24:37; on 2 Sask Man [93, p. 68]; on 3 Sask 25:3, Man 23:37, Ont 45:41, Que 25:20, NB NS 27:101, PEI 25:1; overwintering on 3 in Man 51:11; on 4 Sask Man 23:1, 37; on 5 Alta 52:39, Sask [93], Man 24:77, Que 25:20. *P. g.* f. sp. *tritici* Erikss. & Henn. on 5 Fort Garry, Man 45:41; on 6 Sask 38:68, Man 24:77; also on 13 cult. Man [93], Ont [828]; on 16 Alta 34:95. Examination of basidiospores from germinating teliospores on 5 revealed $n = 6$; the chromosomes appeared as three loose pairs at metaphase and the possibility of a basic number of three for this species is discussed [687]. *P. g.* f. sp. *secalis* Erikss. & Henn.: collections on 3 Ont NB were used in 'intervarietal' crosses of *P. graminis* [505].
- P. montanensis* Ell.: leaf rust, rouille brune: II III on 2 Alta Sask [93, p. 69]; on 4 Alta 25:76, Sask 26:37, Man 24:77; on 5 Alta 24:19, Sask Man [93]; on 6 Alta Sask Man [93]; on 7 Alta 24:57, 25:76.
- P. recondita* Rob. ex Desm. (*P. agropyri* Ell. & Ev., *P. agropyrina* Erikss., *P. clematidis* Lagerh., *P. rubigovera* Wint.): leaf rust, rouille de feuilles: on 2 Alta 25:76, Sask [93, p. 71]; on 3 BC 50:45, Ont [828], Que 32:99, NS 25:76, PEI 25:21; on 4 Alta 25:76, Sask Man [93]; on 5 BC 50:45, Alta Sask 20:20, Man 22:23; on 6 Alaska [1037, 1038], BC 33:105, Alta Man [93]; on 7 Alta 24:57; on 25, 28 Alta [15, p. 179]. Host specialization in Canada studied by Fraser and summarized by Mains [672].
- P. striiformis* West. (*P. glumarum* Erikss. & Henn.): stripe rust, rouille striée: on *A. sp.* Sask 32:4; on 1 BC 39:33, Alta 31:4; on 2, second most important native host in Alta [938, p. 720]; on 3 BC [535]; on 4 Alta 31:4; on 5 Alta 28:33, 5 form 8 BC Alta, form 13 Alta [770]; on 13 Alta [938]. 8, 9, 10, 11, 20, 24, 25 naturally infected, but not on 19 as reported 31:4, in plots at Edmonton, Alta [938].
- Pyrenopeziza karstenii* Sacc.: on 5 Alaska [175, 1038].
- Pyrenophora trichostoma* (Fr.) Fckl.: on 3 NS [1138].
- Pythium aristosporum* Vanterpool: on 1 Sask 41:8, 25.
- P. arrhenomanes* Drechs. or *P. a.* var. *canadensis* Vanterpool & Truscott: browning root rot, piétin brun: on 1 Sask 34:7, Sask Man 33:20; on 3, 5 Sask 33:20, 34:7; on 4 Sask 37:6.
- P. graminicola* Subram. (*P. arrhenomanes* Drechs., *P. aristosporum* Vanterpool): on 1, 3, 4, 5 Sask [1034].
- Ramularia pusilla* Unger (*Ovularia* p. (Ung.) Sacc. & D.Sacc., *O. pulchella* (Ces.) Sacc., *O. p.* var. *agropyri* Davis): leaf spot, tache des feuilles: on 3 Alaska [1038], Ont 46:29, [1034, 1039]; on 5, 18 Alaska [175; cf. 1037].
- Rhizoctonia solani* Kühn: on 3, 5 Alaska [1042].
- Rhynchosporium orthosporum* Caldwell: on 6 Alaska [1037].
- R. secalis* (Oud.) Davis: scald, tache pâle: on 3 BC 43:37, [1034]; on 5 Alaska [175]; on 6 Alaska [1038; cf. 1037].
- Sclerotinia borealis* Bubák & Vleugel: snow mold, moisissure nivéale: on plots of 2, 10, 15, 22, 24 Prince George, BC 55:49, [377]; first noted in 1951, 51:39.
- Selenophoma donacis* (Pass.) Sprague & Johnson: on 3 Alaska Yukon [1042]; on 5 Alaska [1042], Sask [1034]; on 17 Yukon [1042].
- S. donacis* var. *stomaticola* (Bäuml.) Sprague & Johnson: on 5 Alaska [175, 1037].
- S. obtusa* Sprague & Johnson: on 6 BC [1042].
- Septogloeum oxysporum* Sacc., Bomm. & Rouss.: on 6 Alaska [1037, 1038]; on 6, 17 Yukon [1042].
- Septoria agropyri* Ell. & Ev.: leaf spot, tache septorienne: on *A. sp.* Sask 33:105; on 3 Alta 34:95; on 4 Sask Man [93, p. 137]; on 5 Alta Man 33:iii; on 6 Man 33:iii; on 19 Sask [93].
- S. elymi* Ell. & Ev. (*S. agropyri* Ell. & Ev.): on 3 Alta, 5 Sask Man, 6 Man [1034].
- Stagonospora simplicior* Sacc. & Berl.: on 5, 17 Alaska [1037, 1038].
- Urocystis agropyri* (Preuss) Schroet.: leaf smut, charbon des feuilles: on *A. sp.* Man, 3 Ont [292]; on 3 Que 42:35; on 5 Alaska [175, 1037], Que 42:35.
- Ustilago agrestis* Syd. (*U. spegazzinii* Hirschh. var. *a.* (Syd.) Fisch. & Hirschh.): on 3 BC Sask Ont Que [292]; see also *U. hypodytes*.
- U. bullata* Berk. (*U. agropyri* Clint. nom. nud., *U. bromivora* Fisch. v. Wald.): head smut, charbon de l'épi: on 2 Alta [292], Sask 25:21; on 5 Alta 24:29, Sask 20:20, Man 24:77, Que 35:33, NS 33:19; on 6 Alta Sask [292]; fairly common and sometimes destructive in the Prairie Provinces in cult. stands. Smut transferred from 5 to 2 and 6 [313] and also to 13 by Henry, 33:19, 104; readily controlled by seed treatment [93, p. 61].
- U. hordei* (Pers.) Lagerh.: covered smut, charbon couvert: in seed of 1 from Spruce Home, Sask 39:33.
- U. hypodytes* (Schlecht.) Fr.: stem smut, charbon de la tige: on 3 BC 50:43, Ont 32:99, Que 43:33.
- U. macrospora* Desm.: stripe smut, charbon strié: on 3 Ont [292], Que 42:35; on 5 Que 47:37.
- U. salvei* Berk. & Br. (*U. striiformis* (West.) Niessl): on 5 Sidney, BC 41:26, [535]; possibly referable to *U. macrospora*.
- Xanthomonas translucens* (Jones, Johns. & Reddy) Dowson f. sp. *cerealis* Hagborg: bacterial blight, brûlure bactérienne: on 3 Oak Lake, Man 52:40.

Agrostis L.

GRAMINEAE

Annual or, mostly, perennial grasses of temperate and northern regions; cult. species mostly of European origin, some native species also being important for forage.

1. *A. gigantea* Roth (*A. alba* auct. Am.), red top, tremme; Eurasian perennial long cult. for hay; widely naturalized but indigenous northward.
2. *A. palustris* Huds., creeping bent, tremme; European perennial long cult. for fine turf.
3. *A. scabra* Willd. (*A. hyemalis* (Walt.) BSP. var. *tenuis* (Tuck.) Gleason), tickle grass, foin follette; native perennial of N. America. 3a, *A. s.* var. *aristata* Hult. 3b, *A. s.* var. *geminata* (Trin.) Swallen.
4. *A. tenuis* Sibth., colonial bent, franc foin; European perennial cult. for pasture, etc., and extensively naturalized in the Atlantic Provinces and BC. 4a, *A. t.* var. *aristata* (Parnell) Druce.

Other hosts: 5, *A. aequivalvis* (Trin.) Trin. 6, *A. borealis* Hartm. 7, *A. canina* L. 8, *A. exarata* Trin. 9, *A. idahoensis* Nash. 10, *A. lacnantha* Nees. 11, *A. perennans* (Walt.) Tuckerm. 12, *A. reuteri* Boiss. 13, *A. rossae* Vasey. 14, *A. rubra* L. 15, *A. stolonifera* L. 16, *A. thurberiana* Hitchc.

Acremoniella alascensis Sprague: on 8 Alaska [1042, p. 595].

Alternaria tenuis auct. sensu Wiltshire: isolated from seed of 1 Ont [374].

Anguina agrostis (Steinbuch) Filipjev: nematode seed gall, galle nématique des graines: on ?*A. s.* Sask 52:xvi; on 1 PEI 53: xiv; on 4 NS 42:34.

Ascochyta sorghi Sacc.: on 3b Alaska [1037, 1038].

Aureobasidium pullulans (de Bary) Arn.: from seed of 1 Ont [374].

Chaetomium globosum Kze.: from seed of 1 Ont [1009].

Cladosporium herbarum Lk.: on 3b Alaska [957].

Claviceps purpurea (Fr.) Tul.: ergot, ergot: on *A. s.* Alta 29:73; on 1 Alta 54:52, [172]; on 6 Que 32:99; on 7 Alaska [175, 1037], BC 54:52, [172]; on 14 NS 44:35, [1034]. Isolates from rye produced infection on 1, 2, 4 [172].

Darluca filum (Biv.-Bern.) Cast.: on *Puccinia graminis* on 8 Alaska [1038]; on *P. coronata* on 8 Alaska [1042].

Dilophospora alopecuri (Fr.) Fr.: twist, torsion: on 4 NB 60:80.

Drechslera catenaria (Drechs.) Ito: on 1 Alta [993].

D. erythrospila (Drechs.) Shoem. (*Helminthosporium erythrospilum* Drechs.): on *A. s.* Alaska [175, 1037]; on 4 Ont [993].

D. fugax (Wallr.) Shoem. (*D. stenacra* (Drechs.) Shoem.): on 4 BC [1041], Ont [993]; on 5 Alaska [1037].

D. phlei (Graham) Shoem.: on 1 Ont [993].

D. tritici-repentis (Died.) Shoem.: on 1, 3 Ont [993].

Epichloë typhina (Pers.) Tul.: choke, quenouille: on 1 Que 40:27, [1034].

Erysiphe graminis DC. ex Mérat: powdery mildew,

blanc: on 1, 15 Man 34:77 [but not in 93, p. 44]; on 8 Alaska [175, 1037], BC [1041].

Fusarium "avenae": caused an apical blight of shoots of 1 Que 40:27.

F. equiseti (Cda.) Sacc.: from leaf lesions on 2, Washington Bent Ont [335].

F. nivale (Fr.) Ces.: on 2 BC Ont; on 4 Ont, fide Sprague; the perfect state, *Calonectria nivalis* Schnaffnit, is unknown in Canada except in culture [333].

Laestadia graminicola Rostr.: on 14 Greenl [899].

Leptosphaeria sp.: on 3b, 8 Alaska [1038].

L. culmifraga (Fr.) Ces. & de Not.: on *A. spp.* BC [50].

L. leersiana Sacc.: on *A. s.* Alaska [175].

Lophodermium arundinaceum (Schrud. ex Fr.) Chev.: on 8 Alaska [1038]; on 14 Greenl [899].

Low-temperature basidiomycete, basidiomycète frigidophile: 1 severely damaged in Alta [215] and highly susceptible in experimental trials [217]. 90 percent of plants of 1 infected and severe damage caused under controlled conditions [218].

Mastigosporium rubricosum (Dearn. & Barth.) Nannf.: eye spot, tache ocellée: on 15 NB 60:80; on 1, 2, 4, 8 Alaska [1042]; on 5, 6, 8, 15 Alaska [1037].

Microthyrium culmigenum Syd.: on 3 Alaska [1038].

Mycosphaerella ignobilis (Auersw.) Syd.: on 3b Alaska [175, 1037].

M. tassiana (de Not.) Johans.: on *A. spp.* BC [50].

M. tulasnei (Jancz.) Lindau: on 8 Alaska [1038].

Ophiobolus graminis Sacc.: on 3 Alaska [1042]; on 18 Alaska [1037].

Passalora graminis (Fckl.) Höhn. (*Scolecotrichum g. Fckl.*): brown stripe, strie brune: on 1 Ont 46:29, Que 40:27, [cf. 1034]; on 8 Alaska [1042].

Pellicularia filamentosa (Pat.) Rogers: brown patch, plaque brune: on 2 Sask Ont; on 4 Ont [1034].

Periconia sp.: on 5 Alaska [1037, 1038].

Phyllachora graminis (Pers. ex Fr.) Fckl.: tar spot, rayure goudronneuse: on 3 Man [93, p. 47], NS [1138].

Platyospora pentamera (Karst.) Wehm. (*Clathrospora p. Karst.*): on 13 BC [50].

Puccinia coronata Cda.: crown rust, rouille couronnée: on 1 Man 1944, 45:41; on 3b Alaska [1042]; on 8 BC [15, p. 54]; on 15 Que NS 47:21, [cf. 828].

P. coronata f. sp. *agrostis* Erikss.: normal infection on 3, 4, 10, 15 from aecia on *Rhamnus frangula* from Fredericton, NB 47:20; on 4 from aecia from Kentville, NS 52:23, [cf. 828].

P. graminis Pers.: stem rust, rouille de la tige: on *A. s.*, 8 Alaska [1037]; on *A. s.* Alaska [175]; on 1 NS 35:22, PEI 32:30; on 2 NB 30:94 NS [15, p. 174]; on 3 BC [1198], Sask Man [93, p. 68], NS 52:40; on 4 NS 53:50; on ? NB NS 37:20; on 11 NS [15]; on 15 BC 50:45, NS 27:101.

P. graminis f. sp. *agrostidis* Erikss.: infection obtained on 1 with aecia collected in Eastern Canada; second most common 'variety,' 44:18; on 1 NB 45:20, [515]; collections on 1 from Ottawa, Ont, and on 1, 4, 12 from Fredericton, NB, used in 'intervarietal' crosses of *P. graminis* [505], [cf. 828].

P. liatridis (Arth. & Fromme) Bethel ex Arth.: rust, rouille: on 2 Sask 26:37 Man [93, p. 69].

P. poae-nemoralis Otth: II III on 6 Que [828].

P. praegracilis Arth. var. *praegracilis*: rust, rouille: on 16 Glacier, BC, 1901 [950].

P. recondita Rob. ex Desm. (*P. rubigo-vera* Wint.): leaf rust, rouille des feuilles: on 1 NS [1138]; on 3 BC [1198]; on 4 BC [535], NS 51:39; small size of

spores noted, 52:40; on 1, 11 as *P. r.-v* var. *impatiens* (Arth.) Mains NS [15, p. 138; 1138].

Pyrenochaeta terrestris (Hans.) Gorenz, Walker & Larson: on 6 Alaska [1037].

Pyrenopeziza karstenii Sacc.: on 8 Alaska [1038].

Pythium graminicola Subram. (*P. arrhenomanes* Drechs.) on 1 Sask 37:6, [1034].

Ramularia pusilla Unger (*Ovularia p.* (Unger) Sacc. & D. Sacc.): on 4, 11, 15 NB 60:80; on 5, 8 Alaska [1037]; on 15 Alaska [1042]; on 18 Alaska [1038].

Rhizoctonia solani Kühn: on 3b Alaska [1037]; see also *Pellicularia filamentosa*.

Rhynchosporium orthosporum Caldwell: on 8 Alaska [1037].

Sclerotinia borealis Bubák & Vleugel: snow mold, moisissure nivéale: on 7 cult. BC [377]; under controlled conditions grew poorly and caused slight damage to 1 [218].

S. homeocarpa F. T. Bennett (stat. imperfect. *Rhizoctonia monteithiana* F. T. Bennett): dollar spot: on 2 ?Sask 36:19; on 4 Ont Que [1034].

Selenophoma everhartii (Sacc. & Syd.) Sprague & Johnson: on 4 Alaska [1042].

Septogloeum oxysporum Sacc., Bomm. & Rouss.: leaf blotch, tache foliaire: on 5 Alaska [1037]; on 15 Que 61:56.

Septoria agrosticola Sprague: on 9 Alaska [1042].

S. avenae Frank: on 4a BC [1041]; on 6 Alaska [1038]; on 8 Alaska [1037, 1038].

S. calamagrostidis (Lib.) Sacc.: on 3 Alaska [1034], BC [1041]; on 3b, 8 Alaska [1038]; on 8 Alaska [175, 1037].

S. gramineum Desm. (*S. ?arctica* Berk. & Curt., fide Sprague): on 8 Alaska [175].

S. grylli Sacc. (*S. calamagrostidis*, q.v.): on 3b, 8 Alaska [175].

S. triseti Speg.: on leaves of 1 BC [535].

Sphaerella californica Cke. & Hark.: on *A. sp.* Alaska [175, 1038].

Stagonospora agrostidis Syd.: on 6 Alaska [1042].

S. agrostidis f. *angusta* Sprague: on 3a Alaska [1042].

S. mariae Sprague: on 8 Alaska [1042].

Tilletia decipiens (Pers.) Körn.: bunt, carie: on 4 NS and St. Pierre 51:40; in seed lot from US 31:117.

T. pallida G. W. Fischer: bunt, carie: on 7 PEI 51:40.

Typhula sp.: on 3b Alaska [1037, 1038].

T. spp.: under controlled conditions, percentages of plants of 1 infected and degrees of damage caused were: *T. ishikariensis* Imai (*T. idahoensis* Remsb.), 100, severe; *T. incarnata* Lasch ex Fr. (*T. itoana* Imai), 70, moderate; and *T. trifolii* Rostr., 10, slight [218].

Ustilago salvei Berk. & Br. (*U. striiformis* (West.) Niessl): stripe smut, charbon strié: on 1 BC [535]; on 4 BC [292]; on 15 Que 42:34.

Ailanthus Desf.

SIMARUBACEAE

Deciduous trees, nearly ten species native to Asia and n. Australia.

1. *A. altissima* (Mill.) Swingle, tree-of-heaven, ailante; handsome tree, native to China. Planted as a shade and street tree and naturalized in eastern N. America.

Armillaria mellea (Vahl ex Fr.) Kummer: cause of butt decay in tree at Saanichton, BC 49:97, [535].

Alchemilla L.

COMPOSITEAE

Low, mostly perennial herbs of cool regions.

1. *A. alpina* L.; recorded in Greenl, Miquelon and Europe.
2. *A. vulgaris* L.; a collective species, of which one segregate, 2a, *A. filicaulis* Buser, reaches Greenl, w. Nfld and Saguenay Co., Que.

Coleroa alchemillae (Grev.) Wint.: on 2 Greenl [899].

Laestadia alchemillae Rostr.: on 2 Greenl [900, p. 615].

Lamproderma columbinum (Pers.) Rost.: on 2 Greenl [899].

Phoma herbarum West.: on 2 Greenl [899].

Sphaerella melanoplaca (Desm.) Auersw.: on leaves of 1 Greenl [899].

Trachyspora intrusa (Grev.) Arth. (*T. alchemillae* (Pers.) Fckl.): I II III on 2 Greenl [899, 903]; on 2a Greenl [15, p. 98].

Alisma L.

ALISMATACEAE

Paludal or aquatic herbs of warm or temperate regions.

1. *A. triviale* Pursh, common water plantain, alisma plantain-d'eau. In the records below, the host, although given as *A. plantago-aquatica* L. or *A. subcordatum* Raf., was probably *A. triviale*, which occurs in Canada in NS and from Que to BC.

Doassansia alismatis (Nees) Cornu: on leaves of 1 Man [93, p. 60], Man Ont [292].

Physoderma maculare Wallr. (*Cladochytrium m.* (Wallr.) Graff, *C. alismatis* Büsg.): on 1 Man 24:77, [93, p. 29].

Rhynchosporium alismatis (Oud.) Davis: on 1 Man 24:77, [93, p. 120].

Allium L.

LILIACEAE

Biennial and perennial pungent herbs of the northern hemisphere, many native to N. America, a very few grown for ornament and some as vegetables. *A. cepa*, native to s.w. Asia, an important crop vegetable, and a few others, native to Europe and Asia, grown in gardens for their edible stems and leaves for use in seasoning.

1. *A. cepa* L., onion, oignon; universally cult. for food; main production areas in Canada on muck soil in Ont and certain irrigated areas in s. BC; some seed also produced in BC.
2. *A. ascalonicum* L., shallot, échalotte; little cult. in Canada.
3. *A. porrum* L., leek, poireau; about 2,000 lb sown annually in Canada.
4. *A. sativum* L., garlic, ail; little cult. in Canada.
5. *A. schoenoprasum* L., chives, ciboulette; occasionally seen in home gardens.

Allium

Other hosts: 6, *A. acuminatum* Hook. 7, *A. amplexans* Torr. 8, *A. cernuum* Roth. 9, *A. geyeri* Wats. 10, *A. textile* Nels. & Macbr.

Alternaria porri (Ell.) Ciferri (*Macrosporium p.* Ell.): purple blotch, tache pourpre: on 1 Man 42:47, Ont 47:52, Que 44:48, NS in 1931, 40:38, [1138]; uncommon but occasionally destructive, 44:48; ? on 2 Man 38:36.

Aspergillus niger van Tiegh.: black mold, moisissure noire du bulbe: on 1 BC 43:52, Ont 48:35; rare but sporadically severe 53:61.

Botrytis sp.: gray mold, moisissure grise: on 1 after thrips injury Ont 36:27; on 3 in decay of flower scapes BC 45:54.

B. allii Munn: neck rot, pourriture du col: common on 1 Sask 22:56, BC Man 24:37, Man [93, p. 113], NB 27:63; Ont 28:63, NS 32:41, [1138], Que 35:30, Alta 42:47, Nfld 52:51, mainly as a storage rot after wet, cold weather at harvest; heavy losses in BC interior 27:63, 29:30, 43:52 and occasionally in muck areas in Ont 41:37; some loss wherever onions grown, Man 26:24; Sask 46:40; also in a neck rot of young transplants in May, Ont 48:44, [695] and in a blight of seed heads and scapes, BC 44:48. The disease is also known as gray-mold neck rot to distinguish it from small-sclerotium neck rot (*B. squamosa* Walker, q.v.) and mycelial neck rot (*B. byssoidea* Walker) [1119].

B. cinerea Pers.: gray mold or botrytis leaf fleck, moisissure grise: in a neck rot of 1 with *Penicillium* sp. in storage, Sask 52:51; in rot of 3 in field, BC 43:51.

B. squamosa Walker: botrytis leaf blight, brûlure des feuilles: in neck rot of white onions of 1 and in leaf spot of other sorts in Holland-Bradford marsh, Ont 54:56. Influence of light and other environmental factors in mycelium growth and sclerotium formation described [818], but evidence in further studies that temperature rather than light inhibited growth [1059]. The perfect state, *Botrytinia squamosa* Viennot-Bourgin, known in culture from isolates of the fungus made in England, France and Texas [717].

Colletotrichum circinans (Berk.) Vogl. [*C. dematium* (Pers. ex Fr.) Grove f. c. (Berk.) Arx]: smudge, anthracnose: occasionally on white onions of 1 Man 31:42, [93, p. 109], NS 32:41, [1138], Ont 34:36; on 3, 5 in Kamouraska Co., Que 24:44, 45.

Ditylenchus dipsaci (Kühn) Filip.: bulb and stem nematode or nematode bloat, enflure nématique: on 1 Ont 57:62. Where nonsusceptible crops were grown for two years, onions harvested in 1961 were free from nematodes 61:376.

Erwinia carotovora (L. R. Jones) Holland (*Bacillus carotovorus* L. R. Jones): soft rot, pourriture molle: mostly on bulbs of 1 in storage BC 28:79, Que 33:28, Ont 37:29; sometimes severe in Essex and Kent counties, Ont 38:36, 40:37; from decay of flower scapes, Ont 44:46.

Fungi from seed: of 1: *Acremoniella atra* (Cda.) Sacc., BC; *Alternaria consortialis* (Thüm.) Groves & Hughes, Man; *A. porri* (Ell.) Ciferri, Que; *A. tenuis* auct. sensu Wiltshire, Man; *Aspergillus clavatus* Desm., Ont; *A. flavus* Lk., Argentina; *A. fumigatus* Fres., BC; *A. nidulans* (Eidam) Wint., Argentina; *A. niger* van Tiegh., Holland; *A. terreus* Thom, NJ; *Aureobasidium pullulans* (de Bary) Arn., Que; *Bipolaris sorokiniana* (Sacc. in Sorok.) Shoem., *Botrytis allii* Munn, Que; *B. cinerea* Pers., BC; *Chaetomium aurum* Chivers, BC; *C. bostrychodes* Zopf, Ont; *C. cochliodes* Palliser, BC; *C. funicola* Cke., Japan; *C. globosum* Kze., BC;

Cladosporium cladosporioides (Fr.) De Vries, BC; *C. herbarum* Lk., Man; *Curvularia lunata* (Wakker) Boed., Calif [374]. *Fusarium acuminatum* Ell. & Ev., BC Man; *F. avenaceum* (Fr.) Sacc., BC; *F. equiseti* (Cda.) Sacc., Man; *F. moniliforme* Sheldon, Ont; *F. oxysporum* Schlecht., Man Ont; *F. solani* (Mart.) App. & Wr., Ont [334, 374]. *Heterosporium allii* Ell. & Martin, BC; *Microascus cirrosus* Curzi, Calif; *Mucor hiemalis* Wehmer, Ont; *Penicillium pinophilum* Hedgc., BC; *Petriella asymmetrica* Curzi, Que; *Sordaria inaequalis* Cain, Calif; *Stemphylium botryosum* Wallr., BC; *Thielavia basicola* Zopf, Pa; *Trichoderma viride* Pers. ex Fr., Man; *Trichothecium roseum* (Pers.) Lk., BC; *Verticillium albo-atrum* Reinke & Berth., Ont [374; cf. 380, 382]. Of 3: *Alternaria tenuis*, *Cladosporium cladosporioides*, *Aureobasidium pullulans*, *Stemphylium botryosum*, Ont; *Chaetomium cochliodes*, BC [374].

Fusarium spp.: from plant parts of 1, chiefly the bulbs: *F. acuminatum*, Man, and with *F. oxysporum* Schlecht. f. *cepae* (Hanz.) Snyder & Hansen, BC; *F. avenaceum* with *F. o. f. cepae*, Man, and with *Botrytis allii* (q.v.), Ont; *F. moniliforme*, Man; *F. oxysporum*, Man; *F. o. f. cepae*, BC Man, *F. poae* (Pk.) Wr. and *F. solani*, Man [335].

F. oxysporum Schlecht. f. *cepae* (Hanz.) Snyder & Hansen (*F. cepae* Hanz.): basal rot, pourriture fusarienne: severe on 1 in Kelowna district, BC 27-28:64, and now widespread in BC interior, 40:37, causing onion production to be unprofitable in some fields, 39:43; known in Man 49:49, and may occur in Ont 39:43, Que 48:44, NS 43:53, [1138]. Although *F. oxysporum* f. *cepae* is the earliest trinomial, the taxon was first designated by Wollenweber as *F. o. f. 7*.

F. solani (Mart.) App. & Wr. (*F. mallii* Taub.): associated with pink root; see *Pyrenochaeta terrestris* (q.v.).

Heterosporium allii Ell. & Mart.: in leaf blight, brûlure hétérosporienne, of 3 near Victoria, BC 43:51, [535].

Meloidogyne hapla Chitwood; root-knot nematode, nodosité des racines: on 1 Ont 61:376.

Mycosphaerella pallicina (Fr.) Migula: in leaf blight of 1 Ont 40:37.

M. tassiana (de Not.) Johans.: on *A. spp.* BC [50].

Papulaspora sp.: associated with a storage rot of 1 BC 47:52.

Penicillium sp.: associated with a dry rot of 4 in shipment from Ont 53:10.

Peronospora destructor (Berk.) Casp. (*P. schleideni* Unger, *P. schleideniana* W.G.Sm.): downy mildew, mildiou: on 1 BC Ont 20:40, Que 22:56, PEI 23:80, NS 25:47, [1138], NB 26:24, Sask 27:63, [93, p. 30], Alta 44:49, Man 45:56; in BC first confined to the lower mainland, 20:21, and Vancouver I., 34:36, but noted in the interior in 1942, 42:49; in moist seasons heavy losses not uncommon, particularly in seed crops in areas where onions have been grown on a large scale, BC 36:27, 48:44, Ont 38:35, Que 51:52; control obtained with zineb 54:56, 68, also Woolliams in litt.; on 5 Mont Rolland, Que 43:49.

Puccinia blasdalei Diet. & Holw.: 0 I II III on 6, 7 BC [963]. The rust on 10 Alta [15, p. 222] is *P. mutabilis* (q.v.) [fide 963].

P. granulispora Ell. & Gall. ex Ell. & Ev.: 0 I II III on *A. sp.* BC [15, p. 223]; on 8 BC Alta [15, 963]. The rust on 10 Alta [93, p. 68] is presumed to be *P. mutabilis* [cf. 963].

P. mixta Fekl. (*P. porri* sensu lat. non Wint.): rust, rouille: first collected on 5 in 1939 at Vancouver and since at Victoria, BC 43:49; uredinia abundant

each year with some telia, but aecia not seen, 47:48, 49:44; on *I*, 5 BC [963].

Puccinia mutabilis Ell. & Gall.: 0 I II III on 9, 10 Alta [963; cf. 15, p. 224].

Pyrenochaeta terrestris (Hansen) Gorenz, Walker & Larson (*Phoma t.* Hansen): pink root, racine rose: on *I*, under *F. mali* (q.v.), Que 22:56, Ont 25:47, ?BC 39:43, ?PEI 52:48; *P. terrestris* first noted in Ont 47:52, but later *Fusarium* spp., nematodes, 49:49, and *Pythium* sp. found associated; addition of manganese salts to the fertilizer applied at seeding greatly reduced damage, 53:62; often destructive on muck soils in Ont 49:49 et seq.

Pythium irregulare Buism.: root rot or yellow patch, pourridié pythien: causes a disease of greenhouse seedlings of *I* in Ont 49:49 et seq. [692].

Sclerotium cepivorum Berk.: white rot, pourriture blanche: on *I* Man 59:50, Que 63:90; in small planting of 4 BC 51:50.

Stemphylium botryosum Wallr. (*Macrosporium parasiticum* Thüm.): black leaf mold, moisissure noire des feuilles: on *I* Que 29:31, Ont 35:30, BC Man 40:38; leaf mold occasionally follows downy mildew; the perfect state, *Pleospora herbarum* (Fr.) Rabh. reported on dead overwintered seed scapes, 29:31.

Urocystis magica Pass. ap. Thüm. (*U. cepulae* Frost; *U. colchici* (Schlecht.) Rabh., sensu Fischer [292]): smut, charbon: on *I* Ont 20:41, Que 22:56, Man in 1922, 24:37, [93, p. 61], NB 33:27, [1138], BC 47:52, [963], Alta [292]; already destructive in truck gardens about Montreal, Que, in 1923, 24:37, and still spreading, 45:57; spreading also in muck areas in Ont 34:57; in BC interior still confined to 2 fields, 47:52; in shipment of imported seedlings a high percentage were affected, BC 52:52; not yet recorded in coastal BC.

Uromyces aemulus Arth.: 0 I II III on 6 BC [963; cf. 15, p. 224].

Aster yellows virus (callistephus virus 1A): aster yellows, jaunisse de l'aster: on *I* NB 36:27, BC (1943) Man 44:49, Ont 47:53, NS 53:63; infection level low but affected flower heads usually completely sterile, 44:49.

Onion yellow dwarf virus (allium virus 1): yellow dwarf, nanisme jaune: on *I* BC 45:57; causing some damage, 47:53; on 2 NS 46:56.

Excess boron, excès bore: injury on *I* as result of faulty application BC 30:60.

Nonparasitic storage breakdown: because bulbs of *I* were apparently immature at harvest, loss was heavy in a carload from Ont 51:53.

Alnus B.Ehr.

CORYLACEAE

Shrubs or trees of the northern hemisphere and western S. America; of little commercial importance but useful in checking spring runoff.

1. *A. crispa* (Ait.) Pursh, green alder, bois à rames; ascending, bushy shrub, across N. America from Labr to Alaska. The variety, la, *A. crispa* var. *mollis* (Fern.) Fern. ranges only from southern Labr to the Algoma District, Ont.
2. *A. rubra* Bong. (*A. oregana* Nutt.), red alder, aune de l'Orégon; in Canada along the coast of BC. The wood is used for furniture, cabinetwork and wooden wares.

3. *A. rugosa* (Du Roi) Spreng. (*A. incana* auct. Am., not (L.) Moench), and the var. *americana* (Regel) Fern., speckled alder, verne; usually low, crooked, often declining shrubs, in Canada from Labr and Nfld to Sask. The wood is sometimes used as fuel, but has no commercial importance.

4. *A. sinuata* (Regel) Rydb., Sitka alder, aune de Sitka; from Alaska and the Yukon along the coast and the Rocky Mountains of BC southward. Wood used locally for fuel and occasionally for lumber.

5. *A. tenuifolia* Nutt., mountain alder, aune à feuilles minces; in Alaska and in Canada from the mouth of the Mackenzie River southward in BC and east to Prince Albert and Saskatoon, Sask. The wood has no commercial value.

Other hosts: 6, *A. nitida* Endl. 7, *A. rhombifolia* Nutt. 8, *A. viridis* DC. (*A. ovata* Lodd., *A. repens* Wormsk.).

Acanthostigma alni Rostr.: on 8 Greenl [900, p. 619].

Anthostoma melanotes (Berk. & Br.) Sacc.: on decorticated wood of ?*A.* sp. NS [1138].

A. microsporum Karst.: on *A.* sp. Alaska [175].

A. microsporum var. *exudans* Pk.: on *A.* sp. BC F57:85, [1199].

Apiognomonia alniella (Karst.) Höhn.: on *A.* sp. Que [52].

?*Apioportha bavarica* (Petr.) Wehm.: on *A.* sp. Alaska [175].

Armillaria mellea (Vahl ex Fr.) Kummer: root rot, pourridié-agaric: recorded on 2 BC [1198].

Arrhytidia sp.: on 4 Alaska [1038].

Atopospora betulina (Fr.) Petr. (*Euryachora b.* (Fr.) Schroet.): on *A.* sp. Alaska [175].

Aureobasidium pullulans (de Bary) Arn. (*Pullularia p.* (de Bary) Berk.): from twigs of 2 BC F52:150, [1198].

Belonidium parksii Cash: on 2 BC F57:85, [1199].

B. pruinaum (Jerd.) Rehm: on *Cucurbitaria conglobata* (q.v.) on *A.* sp. Alaska [175].

Bertia moriformis (Tode) de Not.: on bark of *A.* sp. BC [50]; on 3 Man [93, p. 50].

Calocera cornea (Batsch ex Fr.) Loudon: on 2 BC [1207].

Calvatia elata (Masse) Morgan: on trunk of *A.* sp. NS [1138].

Cenangium furfuraceum (Roth ex Fr.) de Not.: on *A.* sp. Alta F62:101.

Cercospora alni Dearn. & Barth.: on 4 Alaska [175].

Chlorosplenium aeruginascens (Nyl.) Karst.: on 2 BC [1198].

C. aeruginosum (Oed. ex S. F. Gray) de Not. (*Chlorociboria aeruginosa* (Oed.) Seaver): on 4 Alaska [1038].

Chromocrea gelatinosa (Tode) Seaver: on *A.* sp. NS [1138].

Ciboria alni (Maul) Whetz. (*Sclerotinia a.* Maul): on seed of 3 Man [93, p. 41].

C. amentacea (Balbis) Fckl.: on male catkins of 3 Man [93, p. 39].

Alnus

- Clavariadelphus fistulosus* (Fr.) Corner var. *contortus* Corner: on 2 BC [1207].
- Coniophora olivacea* (Fr.) Karst.: on 2 BC [1198].
- C. puteana* (Schum. ex Fr.) Karst.: brown cubical rot, carie brune cubique; on 2 BC [1198].
- Coriolellus sepium* (Berk.) Murr. (*Trametes* s. Berk.): on *A.* sp. BC [1198].
- Corticium comedens* Nees ex Fr. [*Vuilleminia* c. (Nees ex Fr.) Maire]: on 8 Greenl [900].
- C. galactinum* (Fr.) Burt: white stringy rot, carie blanche filandreuse: on 2 BC [1160, 1198]; see *Abies*.
- C. incrustans* Höhn. & Litsch: on *A.* sp. BC [1198].
- C. laeve* Pers. ex Fr.: on 2 BC [1207]; on 8 Greenl [900]; see *Abies*.
- C. leucoxanthum* Bres.: on 4 Alaska [1038], Yukon [1207]; see *Acer*.
- C. luridum* Bres. [*Gloeocystidiellum* l. (Bres.) Boid.]: on 4 Alaska [1038].
- C. porosum* Berk. & Curt. [*Gloeocystidiellum* p. (Berk. & Curt.) Donk]: on *A.* sp. NS [1138]; on 2 BC [1198].
- C. praeteritum* Jackson & Dearden: on wood of 2 BC [499, p. 152].
- Coryneum macrosporum* Berk. & Br.: on 8 Greenl [900].
- Crepidotus fulvotomentosus* Pk.: on 2 BC F53:155, [1198].
- C. haerens* (Pk.) Sacc.: on 2 BC [1198].
- Cryptocoryneum condensatum* (Wallr.) Mason & Hughes: on *A.* sp. BC [1207].
- Cryptodiaportha oxystoma* (Rehm) Urban: on *A.* sp. Mack F61:105.
- Cryptospora alnicola* Höhn.: on *A.* spp. NS, common [1138].
- C. aurantiaca* Wehm.: on *A.* sp. NS [1138].
- C. femoralis* Pk.: on *A.* spp. NS, 2 NB, ubiquitous [1138]; on *A.* sp. Ont F59:65.
- C. suffusa* (Fr.) Tul.: on 3 Ont F58:59.
- Cryptosporella paucispora* (Pk.) Berl. & Vogl.: on *A.* sp. Ont [872].
- Cryptosporium neesii* Cda.: associated with dieback of 2 BC F52:150, [1198].
- Cucurbitaria globata* (Fr.) Ces.: on 4 Alaska [175].
- Cylindrosporium alni* Dearn. & Barth.: on 2 Alaska [175], BC F55:105, [1198].
- Cyphella capula* (Holmskj.) Fr.: on 8 Greenl [900].
- C. globata* Burt: on *A.* sp. BC [1199].
- C. fasciculata* (Schw.) Berk. & Curt.: on *A.* sp. BC [1203], Ont F60:65; on *A.* spp., 1a NS [1138]; on old 3 Man [93, p. 76].
- Cytidia flocculenta* (Fr.) Höhn. & Litsch.: on 4 Alaska [175].
- Cytospora* sp.: on 4 Alaska [175].
- C. leucosperma* Pers. ex Fr.: on 8 Greenl [900].
- C. pulcherrima* Dearn. & Hansbr.: on 5 BC [253].
- Dacrymyces ellisii* Coker: on *A.* sp. BC [1207].
- Daedalea confragosa* Bolt. ex Fr.: on *A.* spp. NS [1138].
- D. unicolor* Bull. ex Fr.: white spongy rot, carie blanche spongieuse: on *A.* sp. Sask 48:96; on *A.* spp. NS PEI [1138]; on 2 BC [1198]; on 3 Man [93, p. 81]; on 4, 5 Yukon [1207].
- Daldinia concentrica* (Bolt.) Ces. & de Not.: on *A.* sp. Ont F58:59, NS [1138]; on 3 Man, common [93, p. 59].
- D. vernicosa* (Schw.) Ces. & de Not.: on *A.* sp. Ont F48:59, Que 26:30.
- Dasyscyphus bicolor* Bull. ex Fckl.: on 8 Greenl [900].
- Diatrype disciformis* (Hoffm.) Fr.: on bark of *A.* sp. BC [50].
- D. macounii* Ell. & Ev.: recorded on *A.* sp. BC [982].
- D. stigma* (Hoffm.) Fr.: on *A.* sp. Alaska [175].
- Diatrypella discoidea* Cke. & Pk. var. *alni* Cke.: on 3 Ont F58:59.
- D. placenta* Rehm: on 3 Man 33:96, [93, p. 59].
- D. tocciaeana* de Not.: on bark of *A.* sp. BC [50]; on *A.* sp. NS [1138].
- Didymosphaeria nana* Rostr.: on *A.* sp. Alaska [175].
- D. oregonensis* Goodding: canker, chancre didymospherien: on *A.* sp. Alaska [175], BC [50]; on 2 BC F58:102, [1203]; on 4 BC [1207].
- Dothidella alni* Pk.: on *A.* sp. Alaska [175].
- Dothiorella inversa* (Fr.) Höhn.: on 4 Alaska [175].
- Durandiella alni* Groves: on 3 Petawawa For. Exp. Sta., Ont [373, p. 124].
- Eichleriella leveilliana* (Berk. & Curt.) Burt: on 3 NS [1138].
- Encoelia furfuracea* (Roth.) Karst.: on 2 BC [1198].
- Erysiphe aggregata* (Pk.) Farl.: on catkins of *A.* sp. BC [50]; on *A.* spp. NB F56:25; on 1, 1a, 3 NS [1138]; on 2 BC [535]; on 3 Que 31:118.
- Eutypa flavovirescens* (Hoffm.) Sacc.: on 2 BC [1207].
- Eutypella alnifraga* (Wahl.) Sacc.: on *A.* spp. NS, common [1138].
- E. cerviculata* (Fr.) Sacc.: on *A.* sp. Ont F59:65; on 3 Man Ont [93, p. 57]; on 4 Alaska [175].
- E. stellulata* (Fr.) Sacc.: dieback, dépérissement eutypelléen: on *A.* sp. Alaska [175]; on *A.* spp. BC [50]; on 2 BC F56:91, [1198].
- Exidia glandulosa* Bull. ex Fr.: on *A.* sp. Ont F58:59, NB F53:24, NS [1138]; on 4, 5 Yukon [1207].
- E. ?saccharina* Fr.: on 4 Alaska [1038].
- Fenestella minor* Tul.: on *A.* sp. NS [1138].
- F. princeps* Tul.: on *A.* sp. Ont F59:65.
- Fomes annosus* (Fr.) Karst.: on 2 BC F61:124, [1207].
- F. fomentarius* (L. ex Fr.) Kickx: on *A.* sp. BC [1198]; on dead wood of *A.* sp. Ont F55:62.
- F. ignarius* (L. ex Fr.) Kickx: white trunk rot, carie blanche du tronc: on *A.* sp. NS F54:24; on 2 BC F54:129, [1198]; on 3 Sask [93, p. 81]; abundant on 4 BC [1072, p. 681]; from heartrot of 5 Alaska [555]; on 5 Yukon F62:122; recorded on 5 BC [982].
- F. ignarius* var. *nigricans* auct. Am.: on 4 Alaska [175].
- F. pinicola* (Sw. ex Fr.) Cke.: from *A.* sp. Sask F52:97; on 2 BC [1198].
- F. scutellatus* (Schw.) Cke.: causes a white rot of broad-leaved trees, usually *A.* spp.: on *A.* sp. Alaska [1038], BC [1207]; on 3 Ont; culture characters by Nobles [791]; recorded on 5 BC [982].
- Ganoderma applanatum* (Pers. ex Wallr.) Pat. (*Fomes applanatus* (Pers. ex S. F. Gray) Gill.): white mottled rot, carie blanche madrée: on dead 2 Alaska [555], BC [1198].
- Gibberidea alnea* (Pk.) Wehm.: on *A.* spp. NS [1138].
- Gloeocystidiellum leucoxanthum* (Bres.) Boid.: on 4 Yukon [1207]; see *Corticium* l.
- Gloeosporium alni* Ell. & Ev. [*Monostichella* a. (Ell. & Ev.) Arx, 15a, p. 17]: on *A.* sp. Alaska [175].
- Gnomonia setacea* (Pers. ex Fr.) Ces. & de Not.: on 2 BC [50]; on 4 Yukon F60:109, [1207].
- Gnomoniella tubiformis* (Tode) Sacc.: on *A.* sp., 4 Alaska [175]; on leaves of 8 Greenl [899].

- Gonytrichum caesium* Nees & Nees: on *A. sp.* BC [1207].
- Helicogloea pinicola* (Bourd. & Galz.) Baker: on wood of *A. sp.* Ont [45, p. 634].
- Helminthosporium velutinum* Lk.: on 2 BC [1207].
- Helotium caudatum* (Karst.) Vel.: on *A. sp.* Alaska [176].
- H. citrinum* (Hedw.) Fr.: on *A. sp.* NS [1138]; on 2 BC F52:150, [1198].
- H. leucellum* Karst. and *H. virgultorum* (Vahl ex Fr.) Karst.: on *A. sp.* Alaska [176].
- Hericium ramosum* (Bull. ex Mérat) Letellier (*H. laciniatum* Leers ex Banker): on 5 Alaska [555].
- Hymenochaete agglutinans* Ell.: on 3 NS [1138].
- H. badioferruginea* (Mont.) Lév.: on dead 3, etc., Man [93, p. 77].
- H. cinnamomea* (Pers. ex Fr.) Bres.: on *A. sp.* BC [1198].
- H. corrugata* (Fr.) Lév.: on *A. sp.* NS [1138].
- H. tabacina* Sow. ex Lév.: on 2 BC [1198]; on 3 NB F53:24; on 4 Alaska [175]; on dead 5 Alaska [555].
- Hypocrea patella* Cke. & Pk.: on 4 Alaska [1038].
- H. rufa* (Pers.) Fr.: on *A. sp.* NS, 3 NB [1138].
- Hypoxylon deustum* (Hoffm. ex Fr.) Grev. (*H. ustulatum* Bull. ex Fr.): on *A. sp.* BC [50].
- H. fragiforme* (Pers. ex Fr.) Kickx. (*H. majusculum* Cke.): on 4 Alaska [175], common [555].
- H. fuscum* Pers. ex Fr.: on *A. sp.* Alaska [175]; on *A. spp.*, 1a NS [1138]; on 2 BC [50]; on 3 Sask Man, common [93, p. 59], Nfld F53:25; on 4 BC F57:85, [1199].
- H. mammatum* (Wahl.) Miller (*H. morsei* Berk. & Curt.): on *A. sp.* Alta F62:101; on 1a NS [1138]; on 3 Man [93], Ont F58:59; [728, fig. 96], Nfld F53:24; on 4 BC F57:85, [1199].
- H. multiforme* Fr.: on *A. sp.* Alaska [175]; on 2 BC [50, 1198]; on 3 NB F53:24; on 4 Alaska [1038].
- H. rubiginosum* Pers. ex Fr.: on 2 BC [1198].
- H. vogesiaceum* Pers. ex Sacc.: on *A. sp.* BC [50].
- Kuehneromyces mutabilis* (Fr.) Singer & A.H.Sm.: on slash of 2 Alaska [555].
- Lenzites saepiaria* (Wulf. ex Fr.) Fr.: from 2 BC [1198].
- Leptothyrium alneum* (Lév.) Sacc.: on 8 Greenl [899].
- Limacinia alaskensis* Sacc. & Scalia: on *A. sp.* Alaska [51, 175].
- Melampsoridium hiratsukanum* Ito ex Hiratsuka: on 1 Alta F63:105.
- Melanconis alni* Tul.: on 4 BC [50].
- M. alni* var. *marginalis* (Pk.) Wehm. (*M. m.* (Pk.) Wehm.): on *A. sp.* Ont F59:65; on *A. sp.*, 1a NS, very common [1138]; on 1 Que [53]; on 3 Man [93, p. 58]; on 4 Alaska [175].
- M. thelebola* (Fr.) Sacc.: on *A. sp.* Alaska [175]; on *A. spp.* NS [1138]; on 2 BC [50]; on 3 Man [93], Ont F58:59.
- Melanconium sp.*: on *A. sp.* Alaska [1038]; on 2 BC 52:150.
- M. apiocarpum* Lk.: on 4 Alaska [175].
- M. sphaeroideum* Lk.: doubtfully on 1a NS, 3 NB [1138]; on 2 BC [1198].
- Melanomma pulvis-pyrus* (Pers.) Fekl.: on *A. sp.* Alaska [175]; on 2 BC [50, 1198].
- Meliola penzigii* Sacc.: recorded on *A. spp.* PEI 25:61; but otherwise unknown.
- Merulius confluens* Schw. ex Fr.: on 2 BC [1198]; on 4 Alaska [1038].
- M. corium* Fr.: on 2 BC [1198].
- M. niveus* Fr.: on *A. sp.* Alaska [175], BC [1198], NS [1138]; on 3 Sask Man Ont [93, p. 82].
- Microsphaera penicillata* (Wallr. ex Fr.) Lév. (*M. alni* (Wallr.) Salm.): powdery mildew, blanc: on *A. sp.* 1, 3 NS [1138]; on 1a Que 47:99; on 3 Sask Man [93, p. 44], Que 31:118; on 4 Alaska [175].
- Mollisia cinerea* (Batsch) Karst.: on decayed wood of *A. sp.* NS [1138].
- M. fusca* (Pers.) Karst.: on 8 Greenl [900].
- M. uda* (Pers. ex Fr.) Gill.: on *A. sp.* Alaska [176].
- Mycoacia stenodon* (Pers.) Donk: on 2 BC [50].
- Mycoleptodon dichroum* (Pers.) Pat.: on 2 BC [1198].
- Mycosphaerella punctiformis* (Pers. ex Fr.) Starb.: on 2 BC [50]; on 4 BC F60:91, [1207].
- Myxosporium bellulum* (Preuss) Sacc.: on 8 Greenl [900].
- Naemospora alni* Allesch.: on 3 Ont F58:59.
- Nectria cinnabarina* Tode ex Fr. (*Creonectria purpurea* (L.) Seaver): on *A. sp.* Que 33:105; on 2 BC [50]; on 4 Alaska [175].
- N. episphaeria* Tode ex Fr.: on 2 BC [1198]; on Sphaeriaceae on *A. sp.* Alaska [175].
- N. pithoides* Ell. & Ev. (*Creonectria p.* (Ell. & Ev.) Seaver): on bark of dead *A. sp.* BC [50]; on 2 BC F57:85, [1199].
- Neottiella vitellina* Rostr.: on 8 Greenl [900, p. 607].
- Odontia sp.*: on 4 Alaska [1038].
- O. crustosa* (Fr.) Quél.: on 2 BC [1198]; on 4 Alaska [1038]; see *Abies*.
- O. uda* (Fr.) Bres.: on *A. sp.* BC [1207].
- Ophiodothis alnea* (Fr.) Ell. & Ev.: on 3 Man [93, p. 47].
- Panus operculatus* Berk. & Curt.: on dead *A. sp.* Ont [809].
- P. rudis* Fr.: recorded on 2 BC [1198].
- P. salicinus* Pk.: on *A. sp.* BC [1198].
- P. torulosus* Fr.: on 2 BC [1198].
- Passalora bacilligera* (Mont. & Fr.) Mont. & Fr.: leaf spot, tavelure: on 1a Que 47:99.
- P. bacilligera* var. *alnobetulae* Jaap: on 4 Alaska [175].
- Pellicularia vaga* (Berk. & Curt.) Rogers: on *A. sp.* NS [1138]; on 2 BC [1198]; see *Abies*.
- Peniphora affinis* Burt: on 4 Alaska [175].
- P. aspera* (Pers.) Sacc. (*P. setigera* (Fr.) Höhn. & Litsch., *Odontia s.* (Fr.) L. W. Miller): on *A. spp.* NS [1138]; on 2 BC [1198]; on 3 Man [93, p. 80]; on 4 Alaska [175]; see *Abies*.
- P. aurantiaca* (Bres.) Höhn & Litsch. (*P. shearii* Burt): on *A. spp.* NS, common [1138]; on 1 NB F53:25; on 2 BC [1198]; on 3 Man [93, p. 77]; on 4 Alaska [175, 1038], BC [1207]; common and cause of a white rot, Alaska [555].
- P. cinerea* (Fr.) Cke.: on *A. sp.* BC [1198].
- P. cremea* (Bres.) Sacc. & Syd.: on 2 BC [1198]; on 4 Alaska [1038].
- P. erikssonii* Boid.: on 5 Yukon [1207].
- P. gracillima* Ell. & Ev.: on *A. spp.* NS [1138]; see *Abies*.
- P. greschikii* (Bres.) Bourd. & Galz.: on 2 BC [1198]; see *Abies*.
- P. incarnata* (Pers. ex Fr.) Karst. and *P. pubera* (Fr.) Sacc.: on 2 BC [1198].
- P. rimicola* (Karst.) Höhn. & Litsch.: on *A. sp.* Ont [497]; see *Acer*.
- P. tenuis* (Pat.) Massee: on 2 BC [1198]; see *Abies*.

Alnus

- Pezicula alni* Rehm: on *A. sp.* NS [1138]; on *1a* Ont NS, 3 Ont [366, 979].
- P. alnicola* Groves: on 3 Ont Que [366, p. 121; 979].
- P. aurantia* Rehm: on *1a* Ont [366, 979].
- Phlebia radiata* Fr.: on 2 BC [1198].
- Phyllactinia guttata* (Fr.) Lév. (*P. corylea* (Pers.) Karst.): powdery mildew, blanc: on *A. spp.* BC [50], Que 33:105, NB F55:21; on 2 BC 33:105; on 3 Sask [93, p. 44], Que 41:118; on *1, 1a, 3* NS [1138]; on 4 BC 32:99; on 5 Yukon F62:122, [1207].
- Phyllosticta alnea* Oud.: on *A. sp.* Alaska [175].
- Plasmodiophora alni* (Wor.) Möller: on 8 Greenl [900].
- Pleosphaerulina intermixta* (Berk. & Br.) Berl.: on 2 BC [50].
- Pleurophragmium nodosum* (Wallr.) Hughes (*Helminthosporium n.* Wallr.): on *A. sp.* BC [1207].
- Pleurotus ostreatus* (Jacq. ex Fr.) Kummer: on 2 BC [1198].
- P. sapidus* Kalchbr.: on *A. sp.* BC [1198].
- P. serotinus* (Schrad. ex Fr.) Kummer: on *A. sp.* BC [1198]; recorded on 2 BC [1207].
- P. spathulatus* (Fr.) Pk.: on 2 BC [1198].
- Polyporus adustus* Willd. ex Fr.: on 4 Alaska [1038].
- P. albellus* Pk.: causes a white rot: on *A. spp.* BC [50, 1198], NS [1138]; from 3 Ont [791]; on 4 Alaska [175, 555]; culture studies made by Nobles [791].
- P. brumalis* Pers. ex Fr.: on 3 NB F53:25.
- P. caesius* Schrad. ex Fr.: on 4 Alaska [1038].
- P. contiguus* Pers. ex Fr.: on 8 Greenl [899].
- P. dichrous* Fr.: on *A. sp.* BC [1198]; recorded on 2 BC [982].
- P. elegans* Bull. ex Fr.: on 2 BC [1198]; on 4 Alaska [1038].
- P. hirsutus* Wulf. ex Fr.: from *A. sp.* BC [791]; on 2 BC [1198]; on 5 BC [1207]; causes a white spongy rot; for culture studies see Nobles [791].
- P. nidulans* Fr. (*P. rutilans* Pers. ex Fr.): on 4 Alaska [1038].
- P. picipes* Fr.: on *A. sp.* BC [1199]; on 2 BC [1207]; on 4 Alaska [1038].
- P. pubescens* Schum. ex Fr.: causes a white rot of broad-leaved trees: on *A. sp.* BC [1198]; recorded on 2 BC [982]; from 3 Ont Que, for culture studies see Nobles [791].
- P. radiatus* Sow. ex Fr.: on *A. spp.* NB NS [1138]; on *A. sp.*, 4 Alaska [175]; from 3 Que [791]; causes a white rot of old logs of 5 Alaska [555].
- P. semipileatus* Pk.: recorded on 7 BC [982].
- P. stereoides* Fr. on *A. sp.* Alaska [175], probably the fungus usually recorded as *P. planellus* (Murr.) Overh.
- P. tephroleucus* Fr.: on 2 BC [1198].
- P. tomentosus* Fr.: recorded on *A. sp.* BC [982].
- P. tulipiferae* (Schw.) Overh.: on 2 BC [1198]; on 3 Sask [93, p. 84].
- P. varius* Fr.: on 2 BC [1198].
- P. velutinus* Fr.: on *A. sp.* NS [1138]; recorded on 4 BC [982].
- P. versicolor* L. ex Fr.: on *A. sp.* NS, abundant everywhere on decaying wood [1138]; on 2 BC [1198]; causes a white spongy rot of dead 2 Alaska, common [555]; on 4 Alaska [1038].
- Poria ferrea* (Pers.) Bourd. & Galz.: causes a white rot: on *A. spp.* BC [791], NS [1138]; on *A. sp.*, 4, 5 Alaska [175]; on 2 BC [1207]; culture studies made by Nobles [791].
- P. ferruginosa* (Schrad. ex Fr.) Karst.: on 4 Alaska [175].
- P. laevigata* (Fr.) Karst.: on 2 BC [1198].
- P. pannocincta* (Rom.) Lowe (*P. tacamahacae* Baxt.): on 2 BC [1198].
- P. pulchella* (Schw.) Cke.: recorded on *A. sp.* BC [982].
- P. punctata* (Fr.) Karst.: on 4 Alaska [175].
- P. purpurea* (Fr.) Cke.: associated with a white rot of 2 BC F57:85, [1199].
- P. subacida* (Pk.) Sacc.: white stringy rot, carie blanche filandreuse: on 2 BC [1198].
- P. versipora* (Pers.) Rom.: on 2 BC [1198].
- Psilopezia hydrophila* (Pk.) Seaver: on *A. sp.*, etc., NB 34:95, NS [1138].
- Pycnoporus cinnabarinus* (Jacq. ex Fr.) Karst.: on 5 BC [704, 1207].
- Radulum orbiculare* Fr.: on *A. sp.* NS [1138]; on 2 BC [1198].
- R. owensii* Lloyd and *R. quercinum* Fr.: on 2 BC [1198].
- Ramularia ?alnicola* Cke.: on *1a* NS 52:102.
- Rosellinia ligniaria* (Grev.) Sacc.: on 4 BC F57:85, [1199].
- Rutstroemia nervisequia* (Schroet.) W. L. White: on *A. sp.* Alaska [176].
- Scorias spongiosa* (Fr.) Schw.: on *A. spp.* Que NB 33:105, NB NS [1138].
- Scutellinia scutellata* (L. ex Fr.) Lambotte (*Humaria s.* (L. ex Fr.) Fckl.): on 4 Alaska [1038].
- Septoria alni* Sacc.: leaf spot, tache septorienne: on *A. sp.* NB F56:25; on 3 NS 52:102; on 6 Ont 43:95.
- S. alnifolia* Ell. & Ev. on 3 Man [93, p. 127]; on 4 Alaska [175].
- Solenia anomala* (Pers.) Fckl.: on 2 BC [1207]; on 4 BC [1203].
- S. stipitata* Fckl.: on 8 Greenl [900].
- Sphaerella alni-viridis* de Not.: on *A. sp.* Alaska [175].
- Sphaerobolus stellatus* Tode: on *A. sp.* BC [1207].
- Steccherinum ochraceum* (Fr.) S. F. Gray: on *A. sp.* NS [1138]; on 2 BC [1198]; on 4 Alaska [1038]; on down trees of 5 Alaska [555].
- Stenocybe sp.*: on 4 BC [318].
- Stereum complicatum* (Fr.) Fr.: on 2 BC [1198].
- S. gausapatum* (Fr.) Fr.: on *A. sp.* BC [1198]; on 4 Alaska [175]; causes a white rot of down 4 Alaska, common [555].
- S. hirsutum* (Willd. ex Fr.) S. F. Gray: on *A. sp.* NS [1138], Alaska [175]; on 2 BC [1198]; uncommon on slash of 5 Alaska [555].
- S. ostrea* (Blume & Nees ex Fr.) Fr.: on 2 BC [1198].
- S. purpureum* (Pers. ex Fr.) Fr.: on *A. sp.*, 4 Alaska [175]; on 2 BC [1198]; common on 4, uncommon on 5 Alaska [555].
- S. rugosum* Fr.: on *A. sp.* Alaska [175].
- Strickeria obducens* (Fr.) Wint.: on *A. spp.* BC [50]; on 1 Que [53].
- Taeniolella alta* (Ehrenb.) Hughes (*Torula alnea* Pk.): on twigs of 3 Man [93, p. 127].
- Tapesia fusca* (Pers. ex Fr.) Fckl.: on *A. sp.* Alaska [175]; on 4 Alaska [1038].
- Taphrina amentorum* (Sadob.) Rostr.: on 2 Alaska [175, 735, 867].
- T. japonica* Kusano: on 2 Alaska [175, 735], BC [1207].
- T. occidentalis* Ray: leaf blister, cloque des feuilles: on 2 BC [535, 735]; on 5 BC [1207].
- T. robinsoniana* Giesenh. (*T. alni-incanae* auct. Am., non (Kühn) Magn.): catkin blister, cloque des chatons: on *A. spp.* Ont Que NB 31:117; on 3 Man [93,

- p. 34), Ont-NS Nfld [735], NB NS [1138], NB NS PEI Nfld F53:26, NB [867].
- Taphrina Psadebeckii* Johans.: on 4 BC [1207].
- T. tosquetii* (West.) Magn.: leaf blister, cloque des feuilles: on 1a NS Nfld [956, 736].
- Tomentella fusca* (Pers.) Schroet. and *T. granulosa* (Pk.) Bourd. & Galz.: on *A. sp.* BC [1198].
- Trametes stereoides* Fr., sensu Romell: on *A. sp.* NB [1138].
- Trechispora brinkmanni* (Bres.) Rogers & Jackson: white stringy rot, carie blanche filandreuse: on 2 BC [1198]; see *Abies*.
- Tremella aurantia* Schw. ex Fr.: on 2 BC [1207].
- T. lutescens* Pers.: on 3 Man Ont [93, p. 74].
- T. mesenterica* Fr.: on 2, 4 BC [1207].
- Trogia alni* Pk.: on *A. sp.* BC [1198], NB NS [1138].
- T. crispa* Fr.: on *A. spp.* NB NS [1138]; on 2 BC [1198]; on 3 Man [93, p. 96].
- Tubercularia vulgaris* Tode ex Fr.: on 2 BC [1203].
- Tulasnella violacea* (Qué.) Bourd. & Galz.: on *A. sp.* NS [1138].
- Tympanis alnea* (Pers.) Fr.: on *A. sp.* Alaska [175], Alta F62:102, Ont F60:65; on *A. spp.* or *Betula spp.* Ont Que NS Nfld [372]; on *A. spp.* NS [1138]; on 2 BC F61:124, [1207]; on 8 Greenl [900].
- T. alnea* var. *hysterioides* Rehm: on *A. spp.* Ont Que NS [372]; on 4 BC F57:85, [1199].
- Valsa alni* Pk.: on *A. sp.* Alaska [175].
- V. ambiens* (Pers. ex Fr.) Fr.: on 3 Man [93, p. 57], Ont F58:59.
- V. diatrypoides* Rehm: on *A. sp.* Ont F62:71.
- V. oxystoma* Rehm: on *A. sp.* Ont F59:65.
- V. stenospora* Tul.: on *A. sp.* NS [1138].
- V. truncata* Cke. & Pk.: on *A. sp.*, 1 NS [1138].
- Valsaria moroides* (Cke. & Pk.) Sacc.: on *A. sp.* Ont F59:65, BC F57:85, [1199], NS [1138]; on 3 Man [93, p. 58].
- Vararia effusata* (Cke. & Ell.) Rogers & Jacks. (*Corticium effusatum* Cke. & Ell.): from sporophores of 3 Ont. A heterothallic, tetrapolar species; oedoccephaloid conidiophores are developed on both haploid and diploid mycelia [789].
- Venturia ditricha* (Fr.) Karst.: on 8 Greenl [900].
- Xylaria sp.*: on 2 BC [1198].
- X. cornu-damae* (Schw.) Berk. on 4 Alaska [1038].
- X. hypoxylon* (L. ex Fr.) Grev.: on 2 BC [50].
- X. subterranea* (Schw.) Sacc.: on 4 Alaska [1038].

Alopecurus L.

GRAMINEAE

Perennial or annual grasses of temperate and cool regions; provide nutritious forage but not abundant enough to be important.

1. *A. aequalis* Sobol (*A. geniculatus* L. var. *aristulatus* (Michx.) Torr.); across Canada and northern US, most common in the west.
2. *A. alpinus* J. E. Smith (*A. occidentalis* Scribn. & Tweedy), a circumpolar grass; in N. America from Greenl to Alaska and south in the Rocky Mountains in the western US.
3. *A. pratensis* L., meadow foxtail, vulpin des prés; native to Europe, sometimes cult. as a meadow grass and widely naturalized.

Other host: 4, *A. seravchanicus* Ovoz.

- Cladosporium graminum* Cda.: on 2 Frank [900].
- Claviceps purpurea* (Fr.) Tul.: ergot, ergot: on 1 NS 42:34, [1034, 1038]; isolates from rye produced infection on 2 [172].
- Diplodina arctica* Lind: on 2 Frank [600, p. 14].
- Drechslera catenaria* (Drechs.) Ito: on 3 Ont [993].
- Homostegia gangraena* (Fr.) Wint.: on 2 Greenl [899].
- Leptosphaeria culmorum* Auersw.: on 2 Greenl [899].
- L. eustoma* (Fckl.) Sacc. and *L. insignis* Karst.: on 2 Frank [52].
- L. microscopica* Karst.: on 2 Greenl [601].
- Mastigosporium album* Riess: eye spot, tache ocellée: on 3 at Wolfville, NS, severe in a single field 53:50 et seq., and Peggy's Cove, NS, in 1954 [502; cf 198].
- Mycosphaerella lineolata* (Rob.) Schroet. (*Sphaerella l.* (Rob.) de Not.): on 2 Greenl [899].
- M. pusilla* (Auersw.) Johans. (*Sphaerella p.* Auersw.): on 2 Greenl [899].
- M. tassiana* (de Not.) Johans. (*Sphaerella t.* de Not.): on 2 Frank [600, 604, 877], Greenl [602].
- M. tassiana* var. *arctica* (Rostr.) Barr: on 2 Frank [52, p. 24].
- M. tassiana* var. *tassiana*: on 2 Frank [52].
- M. wichuriana* (Schroet.) Johans. (*Sphaerella w.* Schroet.): on 2 Greenl [603, 899].
- Passalora graminis* (Fckl.) Höhn. (*Scolecotrichum g.* Fckl.): on 1 Alaska [175, 1037], Alta 34:95.
- Platyspora pentamera* (Karst.) Wehm. (*Clathrospora p.* (Karst.) Berl., *Pleospora p.* Karst.): on 2 Mack [250], Frank [52], Greenl [601, 901].
- Pleospora arctagrostis* Oud.: on 2 Frank [600].
- P. herbarum* (Fr.) Rabh. var. *herbarum* (*P. discors* (Dur. & Mont.) Ces. & de Not.): on 2 Greenl [601].
- P. magnusiana* Berl.: on 2 Frank [604].
- P. phaeocomoides* (Berk. & Br.) Wint. var. *infectoria* (Fckl.) Wehm. (*P. i.* Fckl.): on 2 Greenl [602].
- P. vagans* Niessl (*P. deflectans* Karst.): on 2 Greenl [601].
- Puccinia graminis* Pers.: stem rust, rouille de la tige: II III on 3 Alta 53:50, Man [93, p. 68], heavy on a few clumps at Ottawa, Ont 46:29; on 1, 3, 4 Ont [828].
- P. recondita* Rob. ex Desm. (*P. rubigo-vera* Wint.): II III on 3 Ont [828], NS [15, p. 180; 1138].
- Ramularia pusilla* Unger (*Ovularia pulchella* (Ces.) Sacc.): on 2 Alaska [175, 1037].
- Sclerotinia borealis* Bubák & Vleugel: snow mold, moisissure nivéale: on 3 cult., Prince George, BC [377].
- Selenophoma everhartii* (Sacc. & Syd.) Sprague & Johnson: on 3 Alaska [1042].
- Septoria oudemansii* Sacc.: on 3 Alaska [1042].
- Uromyces dactylidis* Otth (*U. alopecuri* Szym.): leaf rust, rouille des feuilles: II III on 1 Sask Man [93, p. 72].
- Wetsteinina niesslii* Müll. (*Leptosphaeria gigaspora* Niessl): on 2 Greenl [602].

Althaea L.

MALVACEAE

Tall leafy-stemmed herbs grown in open gardens for their showy flowers, native to Eurasia and North Africa.

1. *A. rosea* (L.) Cav., hollyhock, rose trémière;

Althaea

biennial, native to China; sometimes persists after cult.

2. *A. ficifolia* (L.) Cav., figleaf or Antwerp hollyhock, passe-rose de Provence; similar to 1, native to Europe, but not common in cult.
3. *A. officinalis* L., marshmallow, guimauve; perennial, native to e. Europe, locally an escape to borders of marshes.

Other host: 4, *A. armeniaca* Tenore.

Ascochyta althaeina Sacc. & Bizz.: leaf spot, tache ascochytiq: on 1 Que 31:94, PEI 29:69, 38:96, [1138].

A. parasitica Fautr.: leaf spot, tache ascochytiq: on 1 Man 43:103, [93, p. 132], Que 31:94.

Cercospora althaeina Sacc.: leaf spot, tache cercosporéenne: on 1 Man 23:119, common [93, p. 114], Ont 44:104, PEI 25:71, [1138].

Colletotrichum malvarum (A. Braun & Casp.) Southw.: on 1 Man 40:89.

Erysiphe cichoracearum DC. ex Méral: powdery mildew, blanc: conidial state on *A. sp.* Saskatoon, Sask [93, p. 44].

Phyllosticta ?althaeicola Pass.: on spots on stems of 1 Man [93, p. 135].

P. althaeina Sacc.: leaf spot, tache foliaire: on 1 NB 26:34, PEI [1138].

Plenodomus meliloti Dearn. & Sanford: root rot, pourriture des racines: on 1 Alta Sask 31:94, also [93, p. 136].

Puccinia malvacearum Bert. ex Mont.: rust, rouille: on 1 NB 22:185, [1138], BC and Ont to PEI 23:119, Man 33:69, [93, p. 69], Alta 38:96, Sask 54:128. A microcyclic rust, very common and destructive on this widely grown plant; often epidemic, 25:55, 34:85, and in dry years may still be severe as a result of frequent watering, 49:100. Spraying with bordeaux reduced infection, but spraying with lime sulphur or dusting with sulphur caused early defoliation, 31:94; excellent control by spraying two or three times with zineb [1078]; on 2 London, Ont (Arth. Herb. 39464); on 4 Ottawa, Ont 48:104, [828]; common on the weed *Malva neglecta* (q.v.) 52:109. According to Brown [138], the fungus is homothallic and no pycnia are formed; the rust on 1 in Man equally infected 1 and *M. rotundifolia* (?*neglecta*).

Sclerotinia sclerotiorum (Lib.) de Bary: sclerotinia stem rot, pourriture sclérotique: on 1 Man 34:85, [93, p. 42], possibly in Alta 39:100 and NB 26:34.

Sclerotium deciduum Davis: possibly this fungus on dead stems of 1 Man [93, p. 126]; see *Ceratobasidium anceps* on *Pteridium*.

Septoria malvicola Ell. & Mart.: leaf spot, tache septorienne: on 1 Sask 54:128, Man 25:77, [93, p. 138], Que 30:88.

Virus: mosaic, mosaïque; in 1 PEI 36:76.

Amaranthus L.

AMARANTHACEAE

Coarse, mainly annual plants, both native and introduced; some cult. for ornament and others naturalized, mostly weeds.

1. *A. retroflexus* L., redroot pigweed, amarante réfléchie; coarse annual of cult. fields and

gardens, usually in rich soils; considered a native of tropical America but abundant in Canada.

Albugo bliti (Biv.-Bern.) Ktze. (*Cystopus b.* (Biv.-Bern.) Lév.): white rust, albugine: on 1 BC 25:77, Alta 28:101, Sask 24:57, Man 23:123, [93, p. 29], Ont Que 24:57, NB NS [1138], PEI 25:77; common.

Alternaria ?amaranthi (Pk.) van Hook: on leaves of 1 Man [93, p. 112].

A. ?solani (Ell. & Mart.) Jones & Grout: on leaves of 1 in potato fields Man [93].

Fusarium sp.: associated with severe root rot of *A. sp.* (tampala) Edmonton, Alta 44:73.

F. oxysporum Schlecht.: from apparently healthy roots of 1 Man [335].

Meloidogyne sp. (*Caconema radicola* (Greef) Cobb): on 1 in greenhouse BC 32:110.

Sclerotinia sclerotiorum (Lib.) de Bary: destroyed 30 percent of the plants of *A. sp.* (tampala) Fort Garry, Man 46:57.

Amaryllis L.

AMARYLLIDACEAE

Bulbous plants native to tropical America; usually grown for spring or summer bloom or in late winter under glass.

Botrytis cinerea Pers.: on *A. sp.* (*Hippeastrum sp.*) Alaska [175].

Stagonospora curtisii (Berk.) Sacc.: leaf scorch, grillure: on *A. spp.*; moderately destructive at Montreal Botanical Garden, Que 51:114, 56:123; also BC [535].

Tomato spotted wilt virus (lycopersicum virus 3): spotted wilt, tache de bronze: affected 60% of the plants of *A. spp.* at Montreal Botanical Garden, Que 43:108.

Ambrosia L.

COMPOSITAE

Coarse annuals, some native species widely distributed as weeds and the most important cause of hay fever in Eastern Canada.

1. *A. artemisiifolia* L. var. *elatior* (L.) Descourtils, common ragweed, herbe à poux; across Canada, especially abundant in Ont and Que.
2. *A. trifida* L., giant ragweed, grande herbe à poux; Que to BC.
3. *A. psilostachya* DC. var. *coronopifolia* (Torr. & Gray) Farw., perennial ragweed, herbe à poux vivace; common in Western Canada.

Albugo tragopogonis (Pers.) S. F. Gray: on 3 Man [93, p. 29].

Entyloma compositarum Farl.: leaf smut, charbon des feuilles: on 1 Ont F53:83; on 2 Alta F53:83, Man [93, p. 60], Ont [946]. *Stagonospora ambrosiae* Savile was described from lesions of this smut on ND specimen of 2 [944].

E. polysporum (Pk.) Farl.: on 1 Ont [946], a comprehensive paper on *Entyloma spp.* on N Am Compositae.

- Erysiphe cichoracearum* DC. ex Méral: on 2 Man [93, p. 44].
Plasmopara halstedii (Farl.) Berl. & de Toni: on *A.* sp. NS [1138]; on 3 Man [93, p. 31].
Puccinia xanthii Schw.: III on 2 Man [93, p. 72], Ont [15, p. 190]; on 3 Man [93]; frequent on 2 [cf. 828].
Septoria bacilligera Wint.: on 2 Man [93, p. 137].

Amelanchier Medic.

ROSACEAE

Slender shrubs or small trees of temperate N. America.

1. *A. alnifolia* (Nutt.) Nutt., saskatoon, poire ou saskaton; in Canada from Ont to the Yukon.
2. *A. arborea* (Michx.f.) Fern.; in Canada in s.w. NB and s. Que and Ont.
3. *A. canadensis* (L.) Medic. (*A. oblongifolia* (Torr. & Gray) Roem.); in Canada in s.w. Que; records for this species should be in 2.
4. *A. cusickii* Fern.; Wash, Ore, to Mont and Utah.
5. *A. florida* Lindl.; coastal Alaska to BC and n. Calif.
6. *A. intermedia* Spach; in Canada in Nfld, NS, NB and Que.
7. *A. laevis* Wieg.; in Canada from Nfld and NS to Que and Ont.
8. *A. stolonifera* Wieg.; in Canada from Nfld and NS to n. Ont.

Other hosts: 9, *A. bartramiana* (Tausch) Roem. (*A. oligocarpa* (Michx.) Roem.). 10, *A. humilis* Wieg. 11, *A. huronensis* Wieg. 12, *A. lucida* Fern. (*A. spicata* sensu Jones). 13, *A. pumila* Nutt. 14, *A. sanguinea* (Pursh) DC.

- Aleurodiscus cerussatus* (Bres.) Höhn. & Litsch.: on *A.* sp. BC [599, 1198].
Apiosporina collinsii (Schw.) Höhn. (*Dimerosporium c.* (Schw.) Thüm.): causes a conspicuous black growth on the lower surface of the leaves and a mild witches'-broom; on *A.* spp. BC [50], Alta 49:94, 50:114, F54:112; on 1 Sask Man, common [93, p. 44], Ont 44:98; on 3 NB NS, 6 NS [1138]; on 5 BC 45:101, [1198].
Botryosphaeria obtusa (Schw.) Shoem. (*Physalospora o.* (Schw.) Cke.): black rot, pourriture noire: conidial state on 6 NS 52:102, [996].
Botrytis cinerea Pers.: on 1 Alaska [175].
Calonectria dearnessii Ell. & Ev.: on *Massaria* on 1 Man [93, p. 45].
Calosphaeria princeps Tul.: on *A.* sp. BC [50].
Corticium litschaueri Burt (*C. septentrionale* Burt): on old ? 1 Man [93, p. 76].
Coryneum longistipatum Berl.: on *A.* sp. Alaska [175].
Cryptosphaeria fissicola (Cke. & Ell.) Sacc.: on branches of 1 Man [93, p. 57].
Cylindrosporium sp.: on 5 BC [535].

- Cytospora leucostoma* Sacc.: on 1 Sask [93, p. 133].
C. pulcherrima Dearn. & Hansbr.: on 5 BC [253].
Dermea bicolor Groves: on *A.* spp. Ont [368, p. 462].
Diaporthe tuberculosa (Ell.) Sacc.: twig blight, brûlure des rameaux: severe on *A.* sp. Man 42:97, Ont F60:67; on *A.* spp. NS [1138]; on 1 Man [93, p. 57].
Diatrype stigma (Hoffm.) Fr.: on branches of 1 Man [93, p. 59].
Diatrypella quercina (Pers.) Nit.: on branches of 1 Man [93].
Entomosporium maculatum Lév.: leaf spot, tache des feuilles: on 1 Alta 33:104, Sask [93, p. 130], Man 45:102; on 3 NS [1138].
Erwinia amylovora (Burr.) Winslow et al.: fire blight, brûlure bactérienne: on *A.* sp. Alta F62:101; on 1 Morden, Man 43:95; on 7 Macdonald College, Que 38:96, [cf. 46:64].
Fabraea maculata Atk.: on 3 Kentville, NS [1198]; on 1 Alaska [175], although the latter record may be based on the imperfect state, *Entomosporium maculatum* (q.v.). Except for the unique ornamentation of the spores of the conidial state, the fungus is readily referable to *Diplocarpon* to which it was transferred by Nannfeldt as *D. soraueri* (Kleb.) Nannf. However, this name is untenable as the earliest specific epithet applied to the perfect state is *maculata* Atk.
Fomes scutellatus (Schw.) Cke.: on dead branches of 1 Man [93, p. 81].
Gymnosporangium clavariiforme (Pers.) DC.: 0 I on leaves and fruits of *A.* sp. BC 44:98, Que, common 34:96, PEI 52:102; on *A.* sp., 3, 10 Ont [828]; on 1 Man [93, p. 64; 15, p. 373]; on 3 Ont 34:96, NS [15]; on 3, 7, 8 NS [1138]; on 5 BC [1199]; on 12 NS 56:76.
G. clavipes (Cke. & Pk.) Cke. & Pk. (*G. germinale* Kern): quince rust, rouille du cognassier: 0 I on fruits of *A.* sp. Alta F61:105, Que 32:63; on *A.* spp., 1, 3, 5, 7, 10, 11, 14 Ont [828]; on 1 BC [1198], Sask Man [93]; on 3 Ont Que NS [15, p. 362], NB 34:96, NB NS [1138]; on 6 NB [15, 1138]; on 9 Que, 14 Ont [15]; on 12 NS [1138].
G. corniculans Kern: 0 I on *A.* sp. Alta F61:105; on *A.* spp., 1 Ont [828]; on 1 Sask [15, p. 377], Sask Man [93], Man 43:95; on 14 Ont [15].
G. inconspicuum Kern: 0 I mainly on fruits of 5 BC [1198].
G. juvenescens Kern: 0 I on 1 Alta Sask [15, p. 364], Sask Man [93]; on 5 BC, 13 Alta [15]. According to Prince (Farlowia 2:481. 1946) this species is synonymous with *G. nidus-avis* (q.v.).
G. nelsonii Arth.: 0 I on *A.* sp. Alta F61:105; on 1 BC Alta Man [15, p. 376], Man [93]; on 4, 5 BC [1198].
G. nidus-avis Thaxt.: 0 I on *A.* sp. Alta F53:132; on *A.* spp. Ont [828]; on 1, 4, 5 BC [1198]; on 6 Ont [15, p. 369].
Helicogloea pinicola (Bourd. & Galz.) Baker: on wood of *A.* sp. Ont [45].
Hendersonia mali Thüm.: on living leaves of 1 Man [93, p. 133].
Hymenochaete agglutinans Ell.: between branches of 1 Man [93, p. 77].
H. tabacina (Sow. ex Fr.) Lév.: on *A.* sp. BC [1198].
Hypoxylon fuscum Pers. ex Fr.: on 1 Man [93, p. 59].
Karschia lignyota (Fr.) Sacc.: common on dead 1 Man [93, p. 40].
Lophodermium hysteroioides (Pers.) Sacc.: on *A.* sp. Alta F63:104.
L. tumidum (Fr.) Rehm: on overwintered leaves of 1 Sask [93, p. 43].

Amelanchier

- Massaria pruni* Wehm.: on twigs of *A. sp.* NS [1138].
M. pyri Oth.: on branches of 1 Sask Man [93, p. 56].
Monilinia amelanchieris Honey (stat. conid. *Monilia a.* Reade): blossom blight or fruit rot, pourriture sclérotique: on fruits of *A. sp.* Alta 41:81, 42:92; on 1 Man [93, p. 121]; on 3 NS 52:102.
Nectria cinnabarina Tode ex Fr.: on *A. sp.* Alaska [175].
Peniophora cinerea (Fr.) Cke.: on dead branches of 1 Man [93, p. 77].
P. greschikii (Bres.) Bourd. & Galz.: on *A. sp.* BC [1198]; see *Abies*.
Pezicula pruinosa Farl.: on *A. sp.* Que, 3 Ont [365]; see also the conidial state, *Sphaeronema pruinosa* (q.v.).
Phyllactinia guttata (Fr.) Lév. (*P. corylea* (Pers.) Karst.): on 1 BC [50].
Phyllosticta innumerabilis Pk.: leaf spot, tache foliaire: on *A. sp.* Que F60:44; on 1 Alta 34:96; across Sask and Man [93, p. 135]; moderate on 6, light on 8 NS 52:102.
Pleospora laricina Rehm. var. *l.* (*P. pustulans* Ell. & Ev.): probably this species on 1 Man [93, p. 55].
Podosphaera clandestina (Wallr. ex Fr.) Lév. (*P. oxycanthae* (DC.) de Bary: on 1 Man [93, p. 44].
Polyporus planellus (Murr.) Overh.: on fallen branches of 1 Man [93, p. 83].
P. semipileatus Pk.: on *A. sp.* Man [93].
P. tulipiferae (Schw.) Overh.: on 1 Sask [93, p. 84].
Porothelium poriiforme (Pers. ex Fr.) W.B.Cke.: on *A. sp.* BC [1203]; on bark and rotten wood, Ont Que [205].
Pythium sp.: caused a seedling blight in nursery beds Beaverlodge, Alta 47:100.
Sphaeronema pruinosa Pk.: on *A. sp.* NS [1138]; common on branches of 1 Man [93, p. 140]; the perfect state is *Pezicula pruinosa* (q.v.).
Strickeria amelanchieris Earle: on weathered wood of *A. sp.* BC [50].
S. obducens (Fr.) Wint. (*Teichospora o.* (Fr.) Fckl.): on 5 BC [1199].
Synchytrium vaccinii Thomas: on *A. sp.* NS [542], not *S. aureum* Schroet. 39:85, [1138]. However, the resting spores are aborted in varying degrees [542].
Tubercularia vulgaris Tode ex Fr.: on *A. sp.* BC [1199].
Tympanis amelanchieris Groves: on *A. sp.* Petawawa For. Exp. Sta., Ont [372, p. 618].
Valsa sp.: on *A. sp.* BC [1199].
V. ?ambiens (Pers.) Fr.: canker, chancre cytosporéen: on *A. sp.* Alta 43:95.
V. ceratophora Tul.: on *A. sp.* Ont F59:66.
V. cincta Fr.: on *A. sp.* NS [1138].
V. leucostoma (Pers.) Fr.: common on 1 Man [93, p. 58].

Amorpha L.

LEGUMINOSAE

Shrubs or subshrubs of warm temperate and tropical N. America, sometimes grown in the open for ornament.

1. *A. canescens* Nutt., leadplant; on dry sandy prairies and hills; in Canada in Man.
2. *A. fruticosa* L., bastard indigo, indigo bâtard; a more southerly species, only var. *angustifolia* Pursh reaching Man. The plant is cult.

for ornament and has escaped in northeastern US.

3. *A. nana* Nutt.; in Canada in Man.

- Camarosporium amorphae* Sacc.: on twigs of 2 Man [93, p. 132].
Cercospora passaloroides Wint.: on 1 Man, not a typical *Cercospora* and may be identical with *Cladosporium amorphae* Thüm. [93, p. 115].
Cucurbitaria elongata (Fr.) Grev.: common on 2 Man, associated with *Camarosporium amorphae* (q.v.) [93, p. 51].
Diaporthe amorphae Ell. & Ev.: on 2 Man [93, p. 57].
Diatrype tumida Ell. & Ev.: on branches of 2 Man [93, p. 59].
Diplodia amorphae (Wallr.) Sacc.: common on 2 Man [93, p. 133].
Pleomassaria ?siparia (Berk. & Br.) Sacc.: on 2 Man [93, p. 56].
Sphaeropsis amorphae Ell. & Barth.: on twigs of 2 Man [93, p. 140].
Stagonospora amorphae Dearn. & Bisby: on twigs of 2 Man [93].
Uropyxis amorphae (Curt.) Schroet.: II and III on 1, 2, 3 Man, rather injurious to a hedge of 2 [93, p. 73]; 0 I apparently not observed in Canada.

Ammophila Host

GRAMINEAE

Coarse perennial grasses with creeping rhizomes.

1. *A. arenaria* (L.) Lk., European beachgrass; important sand-binding grass.
2. *A. breviligulata* Fern., American beachgrass, ammophile à ligule courte; on sand dunes on the Atlantic coast and along the larger fresh-water lakes.

- Claviceps purpurea* (Fr.) Tul.: a few ergots in heads of 2 PEI 53:50.
Puccinia coronata Cda.: crown rust, rouille couronnée: on 1 Sidney, BC [535].
P. graminis Pers.: II III on 2 Ont [828].

Ammobium R.Br.

COMPOSITAE

Perennial herbs native to Australia, grown as annuals.

1. *A. alatum* R. Br., winged everlasting, immortelle.

Fusarium solani (Mart.) App. & Wr.: cause of a foot rot of 1 St. Vital, Man 38:96; isolated from diseased basal parts [335].

Amphicarpa Ell.

LEGUMINOSAE

Low twining perennials of eastern N. America and Asia.

1. *A. bracteata* (L.) Fern. (*A. monoica* (L.)

Ell.), hog peanut, amphicarpée bractéolée; in damp woodlands; in Canada from Que to Man.

Cercospora monoica Ell. & Holw.: on 1 Man [93, p. 115], not *C. simulans* Ell. & Kell. as reported in 31:113.

Erysiphe polygoni DC. ex Méral: on 1 Man [93, p. 44].

Synchytrium aecidioides (Pk.) Lagerh. (*Woroniella a.* (Pk.) Sacc., *S. decipiens* Farl.): on 1 Man [93, p. 29], Ont Que 33:106.

Anaphalis DC.

COMPOSITAE

Woolly perennial herbs of the north temperate zone; a few cult. for ornament.

1. *A. margaritacea* (L.) Benth. & Hook., pearly everlasting, immortelle; perennial herb of Eurasia and N. America. 1a, *A. m.* var. *subalpina* Gray; Nfld and NS to BC.

Gloeosporium sp.: on 1 Alaska [1038].

Leptosphaeria doliolum (Fr.) Ces. & De Not.: on 1 Que [53].

L. ogilviensis (Berk. & Br.) Ces. & de Not.: on *A.* sp. Que [53].

Mycosphaerella tassiana (de Not.) Johans.: on 1 BC [50].

Niesslia pusilla (Fr.) Schroet.: on 1 Que [53].

Pleospora ambigua (Berl. & Bres.) Wehm.: on 1 Que [53].

P. helvetica Niessl: on 1 BC [50].

Uromyces amoenus Syd.: III on 1 BC [1198]; on 1a BC [15, p. 265].

Anchusa L.

BORAGINACEAE

Annual or perennial herbs of the Old World, a few cult. for their showy flowers and a few adventive from Europe to states bordering Canada.

1. *A. azurea* Mill., alkanet or bugloss; native to the Mediterranean region; several hort. forms known.

Sclerotinia sclerotiorum (Lib.) de Bary: cause of a basal rot that destroyed 30% of the plants in a seed crop of 1 at Elk Lake, BC 48:104, [535].

Andromeda L.

ERICACEAE

Low evergreen shrubs of the cold regions of the northern hemisphere.

1. *A. glaucophylla* Lk.; a native of Canada and northern US.
2. *A. polifolia* L.; a circumpolar species; probably some of the records under 2 should be under 1.

Exobasidium vaccinii Wor.: on 1 Que Nfld [958]; on 2 Alaska [175], BC Alta Mack Keew Que [958].

Mycosphaerella minor (Karst.) Johans. and *M. vaccinii* (Cke.) Schroet.: on 1 Que [53].

Rhytisma andromedae (Pers.) Fr.: on 2 Alaska [175], BC [1198], Sask Que 32:100, Man [93, p. 42].

Synchytrium vaccinii Thomas: on 1 NS [1138].

Andropogon L.

GRAMINEAE

Tall perennial grasses of tropical and temperate areas; dominant grasses of prairies and plains in the US and also in Canada; valuable for forage and hay.

1. *A. gerardi* Vitman (*A. provincialis* Lam., not Retz, *A. furcatus* Muhl.), big bluestem; dry soil, prairie and open woods; in Canada from Que to Sask.
2. *A. scoparius* Michx. (*Schizachyrium scoparium* (Michx.) Nash), prairie beardgrass or little bluestem; prairies, open woods, dry hills and fields; in Canada from w. NB to Alta.

Mycosphaerella tassiana (de Not.) Johans.: on 2 BC [50].

Platyspora pentamera (Karst.) Wehm. (*Clathrospora p.* (Karst.) Berl.): on 2 BC [50].

Puccinia andropogonis Schw.: II III on 1 Man 34:96, Ont [15, p. 120]; on 2 Sask Man [93, p. 65], Ont [828]. According to Cummins (*Uredineana* 4:60. 1953) the varieties of Arthur are largely untenable and are not reported here.

P. ellisiana Thüm.: on 2 Sask [93, p. 67]; on 1, 2 Ont [828].

Ustilago andropogonis Kell. & Swingle (*Sphacelotheca occidentalis* (Seym.) G. P. Clint.): on 1 Man [93, p. 61; 292].

Androsace L.

PRIMULACEAE

Small annual or perennial herbs of the northern hemisphere; some introduced species cult. for ornament.

1. *A. chamaejasme* Host, including 1a, *A. c.* var. *arctica* R. Knuth, and 1b, *A. c.* ssp. *lehmanniana* (Spreng.) Hult.; arctic Eurasia and Alaska-Yukon.
2. *A. septentrionalis* L.; a circumpolar species, very common in the prairies.

Mycosphaerella tassiana (de Not.) Johans.: on 1 Alaska [175, 604].

Platyspora pentamera (Karst.) Wehm. (*Clathrospora p.* (Karst.) Berl.): on 1 Frank [604].

Pleospora cerastii Oud., nom. dub., fide Wehmeyer [1141, p. 343] (*Pyrenophora c.* (Oud.) Lind): on 1 Frank [604].

P. helvetica Niessl (*Pyrenophora h.* (Niessl) Sacc.): on 1a Yukon [606].

P. phaeocomoides (Berk. & Br.) Wint. (*Pyrenophora p.* (Berk. & Br.) Sacc.): on 1 Alaska [175, 604].

Puccinia volkartiana E. Fisch.: on 1 Alaska [15, p. 251; 175]; on 1b Alaska [175].

Anemone L.

RANUNCULACEAE

Perennial herbs, either exotic and grown under glass for winter bloom and in borders and rock gardens or native occurring on prairies and in woods. Some species extending into the arctic.

1. *A. canadensis* L.; in Canada from NS and Que to BC.
 2. *A. coronaria* L., poppy anemone; native to the Mediterranean region.
 3. *A. cylindrica* Gray; in Canada from NB to Alta.
 4. *A. drummondii* Wats.; in the Rocky Mts. from Alta and BC to Calif.
 5. *A. multifida* Poir. (*A. globosa* Nutt., *A. hudsoniana* Richards.); Nfld, NB and Que to Alaska.
 6. *A. narcissiflora* L. (*A. zephyra* Nels.); mts. of Europe and w. N. America. 6a, *A. n. ssp. interior* Hult. 6b, *A. n. var. villosissima* DC.
 7. *A. parviflora* Michx.; Labr, Que and n. Ont. to e. Asia. 7a, *A. p. var. grandiflora* Ulbr.
 8. *A. patens* L. var. *wolfgangiana* (Bess.) Koch (*A. hirsutissima* auct., *A. patens* ssp. *multifida* (Pritzel) Zamels, *Pulsatilla ludoviciana* (Nutt.) Heller), prairie crocus or pasque flower, crocus; common native of the prairies extending to Alaska-Yukon.
 9. *A. quinquefolia* L., wood anemone, anémone à cinq folioles; in Canada from Que to Man.
 10. *A. riparia* Fern., thimbleweed, anémone des rivages; widespread in Canada.
 11. *A. virginiana* L.; from NS south and west.
- Other host: 12, *A. richardsonii* Hook.

Aecidium ranunculacearum DC.: 0 I on 12 Alaska [175].

Ascochyta ?patagonica Speg.: leaf spot, tache ascochy-tique: on 10 cult., Man 45:107.

Didymaria didyma (Ung.) Schroet.: on 1 Man [93, p. 117].

Fusarium oxysporum Schlecht.: from apparently healthy basal parts of 1 Man [335].

Mycosphaerella confinis (Karst.) Lind: on 7 Mack [250].

M. ranunculi (Karst.) Lind: on 7 Alaska [175, 604].

M. tassiana (de Not.) Johans. (*M. pachyasca* (Rostr.) Vesterg.): on *A. spp.* BC [50]; on 7a, 8, 12 Yukon [600].

Phleospora anemones Ell. & Kell.: on 3 Sask Man [93, p. 134]; on 5 BC [1198]; on 10 Que [197].

Physalospora borealis Sacc.: on *A. sp.* Alaska [175].

Plasmopara pygmaea (Ung.) Schroet.: on 1 Sask Man; common in Sask [93, p. 31]; on 7 Que [197].

Pleospora cerastii Oud. (*Pyrenophora c.* (Oud.) Lind): on 4 Frank [604].

P. coloradensis Ell. & Ev.: on 5 BC [50].

P. comata Auersw. & Niessl (*Pyrenophora c.* (Niessl) Sacc.): on *A. spp.* BC [50]; on 4 Alaska [175, 604]; on 4, 7 Yukon [600]; on 8 Frank [604].

P. penicillus (Schm. ex Fr.) Fekl. var. *p.* (*Pyrenophora chrysospora* (Niessl) Sacc.): on 7 Frank Man [604].

P. tragacanthae Rabh.: on 4 BC [50].

Puccinia anemones-virginianae Schw.: rust, rouille: III on 1 Sask Man [93, p. 65]; heavy on 10 in planting, Fort Garry, Man; on 11 Ont Que [15, p. 157]; on 10, 11 Ont [828].

P. gigantispora Bubák: 0 I III on 3 BC Alta Sask, 5 BC Alta [15, p. 238]; on 5, 6 Alaska [175].

P. magnusiana Körn.: 0 I on 1 Sask [15, p. 156; 93, p. 69]; on 3 Ont [828].

P. pulsatillae Kalchbr.: III on 6, 7, 8 Alaska [175]; on 7 BC Que [15, p. 184]; on 8 Sask Man [93, p. 70]; [cf. 828].

P. recondita Rob. ex Desm. (*P. rubigo-vera* Wint.): 0 I on 3 BC Alta Sask [15, p. 180], Man [93], Ont [15]; on 3, 5, 9, 11 Ont [828]; on 5 Sask [93], Que [15]; on 10 Ont [15]; on 11 Man [93].

P. resecta Sacc.: III on 6 Alaska [15, p. 288; 175].

P. vesiculosa Schlecht. ex Ehr.: on 6b Alaska [175].

Rhabdospora camptospora Sacc. & Scalia: on 6 Alaska [175].

R. pleosporoides Sacc.: on 7 Frank [604].

Selenophoma drabae (Fekl.) Petr. (*Rhabdospora d.* (Fekl.) Berl. & Vogl.): on 7 Mack [250].

Septoria anemones Desm.: on 1 Man [93, p. 137].

Stagonospora pulsatillae Vesterg.: on *A. sp.* Alaska [175].

Tranzschelia fusca Diet.: 0 III on 9 Ont [15, p. 73; cf. 828] sub *T. anemones* (Pers.) Nannf.

T. pruni-spinosae (Pers.) Diet. sensu lat.: rust, rouille: 0 I on 2 cult., II and III occurring previously in same district on *Prunus domestica* BC 48:104, sometimes heavy in some areas, 54:128; on 2 cultivar St. Brigid, BC [1198]; also on 9 Ont Que [15, p. 72], [cf. 828].

T. suffusca (Holw.) Arth.: 0 III on 8 Alaska [175], Sask [15, p. 74], Man [93].

Urocystis anemones (Pers.) Wint.: on 6 Alaska [175]; on 8 Alta [292], Sask Man [93, p. 61]; on 9, 10 Ont, 11 Que [292]; on 10 Que [197].

U. sorosporioides Körn.: on 6 Alaska [175, 292]; on 6a Alaska [953].

Anethum L.

UMBELLIFERAE

Two small herbs native to the Old World.

1. *A. graveolens* L., dill, aneth; European annual or biennial, grown for its seed, which is used in seasoning; locally naturalized in n.e. US.

Fungi from seed: *Alternaria tenuis* auct. sensu Wiltshire, *Aureobasidium pallulans* (de Bary) Arn., *Chaetomium funicola* Cke., *Cladosporium cladosporioides* (Fres.) De Vries, and *Stemphylium botryosum* Wallr., BC [374].

Phoma anethi (Pers.) Sacc.: blight, brûlure: severe infection on 1 at Streetsville, Ont; the hyphomycetous state *Cercosporina anethi* Sacc. was also present, 43:50.

Angelica L.

UMBELLIFERAE

Stout perennial herbs of N. America, Eurasia and New Zealand; plants of minor forage value and sometimes grown in wild gardens.

1. *Angelica archangelica* L. (*Archangelica officinalis* Hoffm.); an arctic species known in Greenl, Scandinavia and w. Asia.
2. *A. atropurpurea* L., alexanders, angélique; in Canada from s. Labr, Nfld and NS to Ont.
3. *A. genuflexa* Nutt.; Alaska to Calif; also in e. Asia.
4. *A. lucida* L. (*Coelopleurum gmelini* (DC.) Ledeb.); Greenl, Labr, Que, Alaska and n.e. Asia.

Asteroma robergei Desm.: on 1 Greenl [899].

Botrytis cinerea Pers.: on 4 Alaska [175].

Calloria minutissima Rostr.: on 1 Greenl [899, p. 537].

Cercospora angelicae (Sacc. & Scalia) Chupp (*C. apii* Fres. var. *angelicae* Sacc. & Scalia): on *A. sp.* Alaska [175, 179].

Cladosporium herbarum Lk.: on 1 Greenl [899].

Coniothyrium conoideum Sacc.: on 1 Greenl [900].

Cudoniella fructigena Rostr.: on 1 Greenl [900, p. 605]. From the reported size and septation of the spores it seems unlikely that this species is identical with *Ombrophila clavus* (Alb. & Schw.) Cke. as regarded by Seaver [979].

Dothidella angelicae (Fr.): on 1 Greenl [900]; apparently a new combination by Rostrup for *Dothidea a.* Fr. (*Phyllachora a.* (Fr.) Fckl.).

Fusicladium depressum (Berk. & Br.) Sacc.: on *A. sp.*, 3 Alaska [175].

Helotium aciculare (Bull. ex Fr.) Pers.: on 1 Greenl [900].

H. cyathoides (Bull. ex Fr.) Karst.: on 1 Greenl [899].

Heteropatella umbilicata (Pers. ex Fr.) Jaap (*Septoria cercosperma* Rostr.): on 1 Greenl [899, 902].

Heterosphaeria patella (Tode) Grev.: on 1 Greenl [899].

Laestadia archangelicae Rostr.: on dry stems of 1 Greenl [899, p. 547].

Leptosphaeria doliolum (Pers.) de Not. and *L. modesta* (Desm.) Karst.: on 1 Greenl [900].

Mollisia angelicae Dearn.: on leaves of 1 London, Ont [979].

M. atrata (Pers.) Karst.: on 1 Greenl [900].

Nyssopsora echinata (Lév.) Arth.: on 4 Alaska [175]; but the host is apparently misdetermined according to Anderson [11].

Ombrophila archangelicae Rostr.: on 1 Greenl [902, p. 119].

Phoma complanata (Tode ex Fr.) Desm.: on 1 Greenl [899].

Pleospora phaeocomoides (Berk. & Br.) Wint. (*Pyrenophora p.* (Berk. & Br.) Sacc.: on 1 Greenl [899].

Puccinia angelicae (Schum.) Fckl.: 0 II III on 3 Alaska [175; cf. 15, p. 319].

P. bistortae (Str.) DC.: 0 I on 4 Alaska [175].

P. bullata (Pers.) Schroet.: 0 II III on 4 Alaska [175]. This rust collection appears to have been misdetermined; it probably is *P. angelicae* (q.v.).

P. coelopleuri Arth.: on 4 Alaska [175].

Ramularia angelicae Höhn.: on 3 Alaska [175].

Antennaria Gaertn.

COMPOSITAE

Perennial, mostly woolly or silky herbs, nearly worldwide but mainly in N. America; a few grown in rock gardens.

Hosts: 1, *A. alpina* (L.) Gaertn. 2, *A. alpina* var. *media* (Greene) Jepson (*A. media* Greene). 3, *A. ekmaniana* Porsild. 4, *A. nitida* Greene (*A. microphylla* Rydb.).

Heteropatella umbilicata (Pers. ex Fr.) Jaap (*Rhabdospora cercosperma* (Rostr.) Sacc., *Septoria c.* Rostr.): on 1 Frank [604], Greenl [899].

Leptosphaerulina pulchra (Wint.) Barr (*Pleospora oligasca* Bubák): on *A. sp.* BC [50].

Mycosphaerella confinis (Karst.) Lind: (*Sphaerella c.* Karst.): on 1 Greenl [899, 901].

M. tassiana (de Not.) Johans. (*Sphaerella compositarum* auct. non Auersw.): on *A. sp.* BC [50]; on 1 Greenl [901].

M. tassiana var. *tassiana*: on 3 Frank [52].

Pleospora ambigua (Berl. & Bres.) Wehm.: on *A. sp.* Frank [52].

P. comata Auersw. & Niessl: on 3 Frank [52].

P. helvetica Niessl: on *A. sp.* Que, 1 Labr [52].

P. penicillus (Schm.) Fckl. var. *p.* (*Pyrenophora chrysospora* (Niessl) Sacc.): on 1 Greenl [603].

P. rainierensis Wehm. (*P. asymmetrica* Wehm.): on 2 BC [50].

P. tragacanthae Rabh.: on 4 BC [50].

Anthemis L.

COMPOSITAE

European annuals, widely naturalized and often becoming weeds in meadows; other species mainly perennial, grown for ornament or as culinary herbs.

1. *A. cotula* L., stinking mayweed, petite marguerite; weedy annual.

2. *A. tinctoria* L., golden marguerite or yellow chamomile, camomille jaune; perennial, naturalized in Que, Alta and probably elsewhere.

Aster yellows virus (*callistephus virus* 1): aster yellows, jaunisse de l'aster: on 2 cult. Winnipeg, Man, severe, 45:107.

Anthoxanthum L.

GRAMINEAE

Sweet-smelling annual and perennial grasses, native to Eurasia and Africa.

1. *A. odoratum* L., sweet vernal grass, foin d'odeur; in fields, pastures and waste places, of little forage value; Greenl and in Canada from Nfld to s. Ont and in BC.

Claviceps purpurea (Fr.) Tul.: ergot, ergot: on 1 NB 60:81.

Leptosphaeria culmifraga Ces. & de Not.: on 1 Greenl [900].

Anthoxanthum

- Mycosphaerella ignobilis* (Auersw.) Syd. (*Sphaerella i.* Auersw.): on *I* Greenl [900].
- Passalora graminis* (Fckl.) Höhn.: brown stripe, striae brune: on *I* NB 60:81.
- Puccinia graminis* Pers.: on *I* NB 60:81, NS [1138].
- P. poae-nemoralis* Otth (*P. poae-sudeticae* (West.) Jørgstæd): on *I* NS [956, 1138].
- Ramularia pusilla* Unger (*Ovularia p.* (Ung.) Sacc.): on *I* NS [956].
- Tilletia holci* (West.) de Toni (*T. anthoxanthi* Blytt): on *I* NS [292, 1138].

Antirrhinum L. SCROPHULARIACEAE

Herbaceous plants native to the northern hemisphere, abundant in w. N. America.

1. *A. majus* L., snapdragon, gueule de loup; perennial herb of the Mediterranean region, widely cult. for ornament in the open as an annual and under glass for cut flowers; escaped in the Atlantic states but hardly persistent.
- Botrytis cinerea* Pers.: gray mold, moisissure grise: cause of a branch dieback in a seed crop of *I* at Elk Lake, BC 48:104; of a crown decay Ont 40:89; of a destructive basal canker, etc., in greenhouse crops at Brampton, Ont 50:120; on *A. sp.* Alaska [175]; on *I* NS 51:110, PEI 52:109.
- Colletotrichum antirrhini* F. C. Stewart (*Gloeosporium a.* F. C. Stewart [*C. gloeosporioides* Penz.]): anthracnose, anthracnose: on *I* Que 27:99, 49:101.
- Cylindrocarpon radiculicola* Wr.: from wilting plants, Winnipeg, Man 44:104.
- Erysiphe cichoracearum* DC. ex Méral (*Oidium sp.*): powdery mildew, blanc: on greenhouse plants of *I* BC 47:103, 49:100, Ont 56:123.
- Fusarium* spp.: associated with root rot and wilt, Alta 39:101, Man 39:95; isolated were *F. acuminatum* Ell. & Ev., *F. equiseti* (Cda.) Sacc., *F. oxysporum* Schlecht., *F. scirpi* Fautr. & Lamb., *F. solani* (Mart.) App. & Wr. (and as *F. s. var. martii* (App. & Wr.) Wr.) 40:89, 44:104; *F. culmorum* (W.G.Sm.) Sacc., *F. oxysporum* var. *redolens* (Wr.) Gordon [335]; apparently rarely heavy.
- Meloidogyne* *Phapla* Chitwood (*Heterodera marioni* (Cornu) Goodey, *Caconema radiculicola* (Greef) Cobb): severe in greenhouse Ont 38:97, Que 32:95.
- Pellicularia filamentosa* (Pat.) Rogers (*Corticium solani* (Prill. & Del.) Bourd. & Galz.): cause of rot BC 30:93, and wilt Ont 56:123.
- Peronospora antirrhini* Schroet.: downy mildew, mildiou: on *A* spp. NS [1138]; on *I* Alta 52:109, Ont 49:101; destructive to seedlings and greenhouse transplants.
- Phyllosticta antirrhini* Syd.: leaf spot, tache foliaire: BC 33:73, Man [93, p. 148], Que 1954, 55:119.
- Phytophthora* sp.: associated with basal rot of *I* Sask 49:101.
- Puccinia antirrhini* Diet. & Holw.: rust, rouille: II (and III) on *I* BC 30:92, Alta 33:73, Sask 30:93, Man 20:35, Ont 31:101, Que 39:95, NB 29:71, NS 30:97, [1138], PEI 37:84. Known from collections made at Sidney, BC, in 1915 by John Macoun, DAOM, and in the Agr. College greenhouse, Winnipeg, Man, by Bisby 30 March 1921 [93, p. 66]; soon prevalent

everywhere. Because of its destructiveness to seed crops in BC, spraying trials were begun, 37:84; of the materials tested at the time [306] bordeaux 4-4-40 plus spreader, two applications before flowering, was effective, but in seasons when rust appeared early, seed plants despite 'consistent spraying' were damaged, 48:104. Resistant cultivars, compared with severely injured susceptible ones, were slightly injured in Alta 44:104, and BC 53:113; infection moderate to severe on Golden Queen at St. Catharines, Ont 52:109, 53:113.

Pythium sp.: root rot, pourriture des racines: of *I* Alta 52:109, Man 53:113; possibly the primary parasite causing root rot and wilt, often followed by *Fusarium* spp. (q.v.).

Sclerotinia sclerotiorum (Lib.) de Bary: stem rot, pourriture sclérotique: on *I* Alta 31:101, Ont 43:102, PEI 48:89; occasionally severe.

Septoria antirrhini Rob. & Desm.: leaf spot, tache septorienne: on *I* BC 42:97, 44:104.

Verticillium sp.: wilt, flétrissure verticillienne: on *I* Ont 31:101, PEI 45:110.

V. albo-atrum Reinke & Berth.: heavy on *I* NS 51:110.

V. dahliae Kleb.: on *I* BC 45:107.

Aster yellows virus (callistephus virus 1): aster yellows, jaunisse de l'aster: on *I* Sask 37:84, NB 31:101, PEI 40:89; infection usually a trace, but 50 percent of the plant severely affected in a garden in Queens Co., PEI 41:87.

?Beet curly-top virus (beta virus 1): curly top, frisolée: on *I* NB 42:97.

Cucumber mosaic virus (cucumis virus 1): cucumber mosaic, mosaïque du concombre: heavy on *I* in fall in greenhouse, Clarkson, Ont 50:120.

Potato bunch-top virus (solanum virus 17): bunch top, feuillage en touffe: on *I* NB 50:120; probably not distinct from aster yellows virus.

Chemical injury: from SO₂ in greenhouse Ont 46:81.

Apargidium Torr. & Gray COMPOSITAE

Perennial herbs, mainly of w. N. America.

1. *A. boreale* (Bong.) Torr. & Gray (*Scorzonella borealis* (Bong.) Greene); Alaska and BC to Calif.

Puccinia dioicae Magn. (*P. extensicola* Plowr.): 0 *I* on *I* Alaska [175].

Sphaerotheca fuliginea (Schlecht. ex Fr.) Magn. (*S. macularis* (Fr.) W.B.Cke. var. *f.* (Fr.) W.B.Cke.): on *I* Alaska [175].

Apios Medic. LEGUMINOSAE

Perennials of eastern N. America and China, twining and climbing over bushes.

1. *A. americana* Medic. (*A. tuberosa* Moench), groundnut, patates en chapelet; in Canada from NB and NS to Ont.

Mollisia apiophila Dearn.: on old stems of *I* London, Ont [979].

Apium L.

UMBELLIFERAE

Annual and perennial herbs widely distributed in temperate zones and in the mts. of the tropics.

1. *A. graveolens* L. var. *dulce* DC., celery, céleri; biennial or perennial herb of Europe, grown widely in gardens for its edible leaf-stalks; commercial cultivation mainly in muck soils in Ont and Que.
2. *A. graveolens* var. *rapaceum* DC., celeriac, céleri rave; cult. for its turniplike root.

Botrytis sp.: gray mould, moisissure grise: cause of a severe rot of *I* in storage PEI 26:22.

B. cinerea Pers.: on *I* Alaska [175]; from roots of celery in storage and grown in Ont 41:33.

Centrospora acerina (Hartig) Newhall (*Ansatospora macrospora* (Osterw.) Newh.): storage rot, pourridié noir: first recognized in 1934 as the cause of a butt rot of celery in storage from the Thedford Marsh, Ont; losses varied with the season from nil to complete destruction; phenylmercury acetate, 1:4000, as a butt dip, controlled the disease, 43:48, 46:37, [1093]; also on four farms near Burlington, Ont; copper 7-hydroxyquinolate now used instead of the organic mercurial, 56:56.

Cephalosporium apii Smith & Ramsay: brown spot, tache brune: on green cultivars of *I* in Wentworth and York counties, Ont 51:47, 52:47.

Cercospora apii Fres.: early blight, brûlure cercosporéenne: on *I* BC [535], Man 34:33, [93, p. 114], Ont 20:39, Que 23:77, NB 22:54, NS 38:22, PEI 26:22, [1138]. Often reported but usually kept under control by the spray program required for late blight; occasionally destructive when the disease appears early in the season, 40:33, in fields under irrigation, 48:41, or cropped continuously to celery, 38:32.

Erwinia aroideae (Townsend) Holland: soft rot, pourriture molle: associated with severe root rot of *I* Ont 51:47.

E. carotovora (L. R. Jones) Holland (*Bacillus carotovorus* L. R. Jones): soft rot, pourriture molle: on *I* BC 23:77, Sask 34:33, Man [93, p. 28], Ont 27:60, Que 41:34, NB 22:54, PEI 26:33, [1138]. Occurs occasionally in the field late in the season or more usually in storage after wet weather at harvest, 56:56; noted after insect injury, 41:34; important cause of secondary decay in celery affected by black heart [878].

Fungi from seed: of *I*: *Alternaria consortialis* (Thüm.) Groves & Hughes, Mich; *A. tenuis* auct. sensu Wiltshire, Calif; *Aureobasidium pullulans* (de Bary) Arn., *Botrytis cinerea* Pers., NJ; *Chaetomium elatum* Kze. & Schm., Mich; *C. succineum* Ames, *Cladosporium cladosporioides* (Fres.) De Vries, Calif; *C. herbarum* Lk., Calif NJ; *Cunninghamiella echinulata* Thaxt., Calif; *C. elegans* Lendner, Mich; *Epicoccum nigrum* Lk., NY [374]. *Fusarium acuminatum* Ell. & Ev., Calif; *F. equiseti* (Cda.) Sacc. NJ; *F. poae* (Pk.) Wr., Ont [334]. *Oospora lactis* Fres., NJ; *Sordaria curvispora* Cain, Calif; *S. fimicola* (Rob.) Ces. & de Not., Mich; *Stemphylium botryosum* Wallr., Mich; and *Verticillium albo-atrum* Reinke & Berth., NJ [374].

Fusarium ?*oxysporum* Schlecht. f. *apii* (Nels. & Sherb.) Snyder & Hansen: fusarium yellows, jaunisse fusarienne: on *I* Ont 24:35, interior BC 31:38; a rare and ill-defined disease.

Meloidogyne hapla Chitwood: root-knot nematode, nodosité des racines: light infection on *I* about Brantford, Ont 56:56; 41 species of weeds were found to be hosts of this nematode in Ont [1089] and many of the same weeds are also hosts of *Pratylenchus penetrans* [1088]. These weeds can serve as reservoirs of nematode inoculum.

Physarum cinereum (Batsch) Pers.: an occasional plant of *I* suffocated by the slime mold, Ont 27:60.

Pratylenchus macrophallus (de Man) Goodey: pin nematode, nématose des racines: cause of considerable root rot in the Thedford Marsh, Ont 54:63, 55:60.

P. penetrans (Cobb) Filipjev & Stekh.: root-lesion nematode, nématose des racines: present on *I* about Burlington, Ont 56:56.

Pseudomonas apii Jagger (*P. jaggeri* Stapp): bacterial blight, brûlure bactérienne: on *I* BC 37:26, Ont 54:55, Que 25:43; bordeaux or copper-lime dusts were ineffective against the disease in the Bradford Marsh, Ont, where it has become increasingly important, 56:56.

P. fluorescens (Flügge) Migula: recorded causing a destructive rot of *I* in storage in 1933, Ont 35:28.

Pythium spp.: damping-off, fonte: on *I* Ont 41:34, Que 40:33, ?NB 55:60; occasionally destructive in seedlings and transplants.

Rhizoctonia crocorum (Pers.) DC.: violet root rot, rhizoctone violet: severe on a low percentage of plants of *I* in the Thedford Marsh, Ont 52:47 et seq.

R. solani Kühn: damping-off, fonte des semis: on *I* Ont 36:24, NB 44:44.

Sclerotinia sclerotiorum (Lib.) de Bary: drop or sclerotinia rot, pourriture sclérotique: on *I* in field Alta 34:33, Ont 33:25, NB 32:37; in storage, Ont 39:40, PEI 26:23; not common in celery.

Septoria apii Chester (*S. petroselini* Desm. var. *apii* Bri. & Cav.) and *S. apii-graveolentis* Dorogin: late blight, brûlure septorienne: on *I* BC 20:39, Alta 25:43, Man [93, p. 137], Sask 41:34, Ont Que 22:54, NB NS PEI 24:35, [1138]. An important disease of celery; the small-spot form, *S. apii-graveolentis*, was first reported from a collection made at St. Martin, Que, 31:38. Before 1931 the large-spot form, *S. apii*, was fairly common and caused appreciable damage to the more susceptible self-blanching cultivars, such as Paris Golden, 23:57; after 1931 late blight became more destructive with severe losses first in Ont 35:27, and although the causal organism was not always specifically determined, increased prevalence and spread of the disease was apparently due to the presence of *S. apii-graveolentis* [cf. 93]. Today, in the main celery-growing areas, the crop is regularly protected by a fungicide; zineb has largely replaced bordeaux sprays or copper-lime dusts. Gabrielson and Grogan [320a] reduce both species to synonymy under *Septoria apiicola* Speg.

Typhula variabilis Riess: on *I* in cold storage Que [877].

Aster yellows virus, California strain (callistephus virus 1A): aster yellows, jaunisse de l'aster: on *I* Alta (as stunt) 33:24, Sask 44:44, Ont 53:58, NB 30:86, 49:44. Although the level of infection fluctuates greatly from year to year, the disease appears to be gradually becoming more prevalent; loss about Burlington, Ont, in 1954 estimated to be 5% of the crop. In Ont, virus successfully transmitted from celery to China aster and celery, from wild *Daucus carota* and *Aster novae-angliae* to celery, from

Apium

celery to carrot and from celery through China aster to *Zinnia elegans* by the leafhopper *Macrostelus fascifrons* (Stål). Virus also transmitted from celery to celery by the leafhopper *Fieberiella florii* (Stål), but because *M. fascifrons* generally occurs in large numbers throughout the season on celery, whereas *F. florii* does not, the former leafhopper is considered to be responsible for most of the spread of celery yellows in Ont [325].

Cucumber mosaic virus (cucumis virus 1): cucumber mosaic, mosaïque du concombre: on 1 Ont 45:52, NB PEI 42:44; rare but virus definitely identified, 54:64.

Boron deficiency, carence de bore: stem cracking, gerçure: on 1 Ont 35:28, Que 37:26, NB 42:44, ?PEI 44:44. As the soil becomes more deficient of boron, the symptoms are, progressively, stem cracking, dwarfing, and heart atrophy [578]. Occasionally the crop is a total loss especially where lime has been applied, 39:39, or in soils over limestone, 48:41, but the use of fertilizers containing boron has in most instances eliminated severe damage, 41:34. Foliar applications are sometimes used in dry years to improve control, 56:57.

Magnesium deficiency, carence de magnésie: chlorosis, chlorose: on 1 Ont 36:57.

Potassium deficiency, carence de potasse: on 1 Ont 27:48.

Nonparasitic, physiologique: black heart, cœur noir: on 1 Alta 43:49, Sask 46:37, Ont 25:43, Que 42:44, NS 40:34, PEI 32:37. In some seasons extremely prevalent and destructive in parts of Ont, where early plantings are the more severely affected, the greatest damage occurring as the plants near maturity. Appearance in the field generally preceded by a period of high humidity or high temperature or both; some differences in cultivar susceptibility; proved to be a physiological disorder [901].

Apocynum L.

APOCYNACEAE

Perennial herbs of the northern hemisphere.

1. *A. androsaemifolium* L. (*A. scopulorum* Greene), spreading dogbane, herbe à la puce; a valuable honey plant, Nfld to Alaska and south into the US.
2. *A. cannabinum* L., indian hemp, chanvre sauvage; in Canada from western Que to Alta.
3. *A. sibiricum* Jacq., in Canada from Nfld and NS to BC.

Ceratobasidium anceps (Bres. & Syd.) Jackson: on 1 Ont [495].

Cercospora apocyni (Ell. & Kell.) Trel.: on 1, 3 Man [93, p. 115].

Cylindrosporium apocyni Ell. & Ev.: on leaves of 1 Sask, 2 Man [93, p. 129].

C. sibiricum Dearn. & Bisby: on leaves of 1 Sask 34:96; on 1 Sask, 3 Man [93, p. 130].

Puccinia seymouriana Arth.: 0 I on 1 NS [1138]; on 2 Que 32:100, [cf. 15, p. 116].

Pyrenopeziza dearnessii Rehm: on dead stems of 1 London, Ont [979].

Septogloeum apocyni Pk.: on leaves of 3 Man [93, p. 131].

Aquilegia L.

RANUNCULACEAE

Attractive herbaceous perennials of the northern hemisphere, many of them cult., as well as hybrid races between species.

1. *A. canadensis* L., columbine or 'honeysuckle,' gants-de-Notre-Dame; in Canada in NS, Que and Ont.
2. *A. flavescens* Wats., yellow columbine; native to the Rocky Mts.
3. *A. formosa* Fisch., wild columbine; from Utah and Calif to Alaska.
4. *A. vulgaris* L. European or common columbine, gants-de-Notre-Dame; native to Europe, now escaped in Canada from Nfld and NS to Ont.

Actinonema aquilegiae (Thüm.) Grove (*Marssonina aquilegiae* Dearn.): leaf spot, tache ascochytiq: on *A. sp.* cult. BC 45:108; on *A. sp.* Man [93, p. 130], Que 52:109; *Actinonema* is a genus doubtfully distinct from *Marssonina*, but *M. aquilegiae* Dearn. may not be available.

Ascochyta aquilegiae (Rabh.) Höhn.: on *A. sp.* Alaska [175]; probably the same as *Actinonema aquilegiae* (q.v.).

Clasterosporium tenuissimum (Nees) Sacc.: cause of a leaf spot of *A. sp.* Ont 36:75.

Erysiphe polygoni DC. ex Mérat: powdery mildew, blanc: on *A. spp.* BC 25:69, Man 45:108, Que 35:66, NB 33:66, PEI 46:81; sometimes heavy; on 3 Alaska [175], BC [50]; on 4 NS [1138].

Haplobasidium pavoninum Höhn.: leaf blotch, brûlure des feuilles: on *A. sp.* Alaska [175], BC 47:103.

Mycosphaerella coerulea (Ell. & Ev.) Tracy & Earle and *M. tassiana* (de Not.) Johans.: on *A. spp.* BC [50].

Pleospora herbarum (Fr.) Rabh. var. *h.* (*P. armeriae* (Cda.) Ces. & de Not.): on 3 BC [50].

P. scrophulariae (Desm.) Höhn. var. *compositarum* (Earle) Wehm. (*P. c.* Earle): on 3 BC [50].

Puccinia recondita Rob. ex Desm. (*P. clematidis* Lagerh., *P. rubigo-vera* Wint.): rust, rouille: 0 I on *A. sp.* cult. BC 38:97; on 2 Alta [15, p. 178]; on 3 BC [535], Alaska [175], BC Alaska [15].

Sclerotinia sclerotiorum (Lib.) de Bary: sclerotinia rot, flétrissure sclérotique: on *A. sp.* cult. PEI 37:75.

Septoria aquilegiae Ell. & Kell.: leaf spot, tache septorienne: on *A. sp.* Que 36:75; on 1 Ont 39:101.

Cucumber mosaic virus (cucumis virus 1): cucumber mosaic, mosaïque de concombre: on 1 Ont 43:102; on 3 Ont 44:104; successfully transmitted from *A. sp.* to cucumber, 43:27.

Arabis L.

CRUCIFERAE

Small annual, biennial or perennial herbs of N. America and Eurasia; very few cult. for ornament in borders and rock gardens.

1. *A. alpina* L., lady's cushion, corbeille d'argent; in Greenl and the eastern Canadian arctic south to Nfld and Que.

2. *A. divaricarpa* Nels. (*A. brachycarpa* (Torr. & Gray) Britt.); in Canada from Que to Man and in the Yukon.
3. *A. drummondii* Gray; in Canada from Labr to Alta and BC.
4. *A. hirsuta* (L.) Scop., moutarde blanche; from NB and Que to the Yukon.
5. *A. holboellii* Hornem. var. *holboellii*; in Canada in the Yukon, BC and Alta. 5a, *A. h.* var. *retrofracta* (Grah.) Rydb.; in Que and Ont and from Sask to BC.
6. *A. lyrata* L. var. *lyrata*; in Canada in the Yukon, BC and Alta. 6a, *A. l.* var. *kamchatica* Fisch. ex DC.; Alaska to n. Wash, Alta and Sask.

Other hosts: 7, *A. arenicola* (Roch.) Gelert. 8, *A. confinis* Wats. 9, *A. glabra* (L.) Bernh. 10, *A. hirsuta* (L.) Scop. (*A. ovata* Poir.). 11, *A. hookeri* Lange. 12, *A. humifusa* (Vahl) Wats. 13, *A. lemmonii* Wats. 14, *A. lignipes* Nels. 15, *A. lyallii* Wats. 15a, *A. l.* var. *occidentalis* Wats. 16, *A. nuttallii* B.L. Rob. 17, *A. puberula* Nutt.

Albugo cruciferarum S. F. Gray (*A. candida* (Pers. ex Lév.) Ktze., *Cystopus candidus* (Pers. ex Lév.) de Bary): white rust, albugine: on 1 cult., BC 47:104; on 9 Man [93, p. 29].

Calloria minutissima Rostr.: on 5 Greenl [901].

Hendersonia arabisidis Rostr.: on 5 Greenl [899, p. 571].

Leptosphaeria johansonii Müller: on 1 Que [52].

L. tenera Ell.: on 3 BC [52].

Metasphaeria arabisidis Johans.: on 1 Greenl [899].

Mycosphaerella punctiformis (Pers. ex Fr.) Starb. var. *clematidis* Jaap: on 4 BC [50].

M. tassiana (de Not.) Johans. (*Sphaerella pachyasca* Rostr.): on *A. spp.* BC [50]; on 1 Greenl [899]; on 5 Greenl [899, 901].

M. tassiana var. *arctica* (Rostr.) Barr: on 7 Frank [52].

Peronospora parasitica Fr.: downy mildew, mildiou: on 4 Alaska [175].

Platyspora pentamera (Karst.) Wehm. (*Pleospora platyspora* sensu Rostr.): on 5 Greenl [899].

P. planispora (Ell.) Wehm. (*Clathrospora p.* (Ell.) Berl.): on *A. spp.* BC [50].

Pleospora comata Auersw. & Niessl: on *A. spp.* BC [50].

P. herbarum (Fr.) Rabh. and *P. scrophulariae* (Desm.) Höhn.: on 12 Hudson Bay 55° N. [604].

Puccinia arabicola Ell. & Ev.: 0 I III on 8 Ottawa, Ont [828].

P. holboellii (Horn.) Rostr. (*P. thlaspeos* Schub., sensu lat.): 0 III systemic on *A. sp.*, 2, 5, 5a, 6a, 15a Alaska [175]; on *A. sp.*, 7 Ont [828]; on 2, 14 Alta, 3, 15 BC [15, p. 149]; on 4 BC [1199]; on 5 Greenl [899]; on 5a BC 31:118; on 13 BC [1198]. If *P. hoboellii* is not a distinct species it at least deserves varietal rank [cf. 15, p. 239].

P. monoica Arth.: 0 I systematic on *A. spp.* Sask Man, 2, 5a, 10 Sask [93, p. 69]; on 3 Alta, 5a BC, 6 Ont, 16 BC [15, p. 147]; on 4 BC [1199]; on 17 BC [1203]; [cf. 828].

Rhabdospora longissima Sacc.: on 1 Greenl [902].

Septoria arabidicola Rostr.: on 1 Greenl [899, p. 574].

S. arabisidis Sacc.: on 11 Greenl [899].

Sirococcus cylindroides Sacc.: on 1 Greenl [899].

Aralia L.

ARALIACEAE

Aromatic herbs, shrubs or small trees, native to Asia, Malaya, Australia and N. America; a few occasionally grown for various purposes.

1. *A. nudicaulis* L., wild sarsaparilla, salsepareille; in woodlands from Nfld, Labr and NS to BC.

Ceratobasidium anceps (Bres.) Jackson: on 1 Ont Que [495].

Cylindrosporium leptospermum Pk. (*Cercospora leptosperma* Pk., *Cercoseptoria l.* (Pk.) Petr.): on leaves of 1 Sask 31:118, Sask Man [93, p. 130], NS [1138].

Leptothyrium vulgare (Fr.) Sacc.: on 1 NS [1138].

Nyssopsora clavellosa (Berk.) Arth.: on 1 Sask Man [93, p. 64], NS [1138], Sask Ont Que NB NS Nfld [15, p. 100]; [cf. 828].

Trichometasphaeria gloeospora (Berk. & Curt.) Holm: on 1 Que [53].

Verticillium albo-atrum Reinke & Berth.: reported on *A. sp.* Victoria, BC 57:122.

Arbutus L.

ERICACEAE

Evergreen trees or shrubs, native to the Mediterranean region, the Canary Islands and western N. America.

1. *A. menziesii* Pursh, arbutus or madrone, madroño; known from Calif to BC, occurring on both sides of the Straits of Georgia; too rare to be of any great commercial importance.

Aleurodiscus macrocystidiatus Lemke: on 1 BC [599, p. 255].

Ascochyta hansenii Ell. & Ev.: leaf spot, tache des feuilles: on 1 BC 41:81.

Coccomyces quadratus (Schmidt & Kunze) Karst.: on 1 BC [1198].

Corticium deflectens (Karst.) Karst. and *C. scutellare* Berk. & Curt.: on 1 BC [1198].

C. sulphureum (Pers. ex Fr.) Fr.: on 1 BC [1198]; see *Abies*.

Dacrymyces sp.: on 1 BC [1198].

Didymosporium arbuticola Zeller: on *A. sp.* BC F62:121.

Diplodia maculata Cke. & Harkn.: on 1 BC [1198].

Exobasidium affin. *vaccinii* Wor.: on 1 BC [958].

Fomes igniarius (L. ex Fr.) Kickx: white trunk rot, carie blanche du tronc: on 1 BC [1198].

Hymenochaete spreta Pk. and *H. tabacina* (Sow. ex Fr.) Lév.: on 1 BC [1198].

Hysterographium vulvatum (Schw.) Sacc.: on 1 BC [1198].

Monochaetia desmazierii Sacc.: on 1 BC [1198].

Mycosphaerella arbuticola (Pk.) House: leaf spot, tache des feuilles: on 1 BC 31:89, [50]; sometimes prevalent, 32:72.

Arbutus

- Odontia crustosa* (Pres.) Quél.: on 1 BC [1198]; see *Abies*.
O. uda (Fr.) Bres.: on 1 BC [1198].
Peniophora aurantiaca (Bres.) Höhn. & Litsch.: recorded on 1 BC [1198].
P. cinerea (Fr.) Cke. and *P. incarnata* (Pers. ex Fr.) Karst.: on 1 BC [1198].
Pleurotus serotinus (Schröd. ex Fr.) Kummer: recorded on 1 BC [1198].
Polyporus abietinus Dicks. ex Fr.: on 1 BC [1198].
P. pargamensis Fr.: on 1 BC [fide Ziller, 1982].
P. versicolor L. ex Fr.: causes a white spongy rot of broad-leaved and, rarely, coniferous trees: isolate from 1 BC used in culture studies [791].
Poria cinerescens Bres. and *P. ferrea* (Pers.) Bourd. & Glaz.: on 1 BC [1198].
P. ferruginosa (Schröd. ex Fr.) Karst.: on 1 BC [1982].
P. stenosporea Overh.: on 1 BC [1198]; but more probably *P. ferox* Long & Baxt. [618].
P. subacida (Pk.) Sacc.: white stringy rot, carie blanche filandreuse: on 1 BC [1982].
Pucciniastrum sparsum (Wint.) E. Fisch. (*Thecopsisora sparsa* (Wint.) Magnus): leaf rust, rouille des feuilles: II III on 1 BC 34:72, [1198; cf. 15, p. 17].
Rhytisma arbuti Phill.: tar spot, tache goudronneuse: on 1 BC 34:72, [1198]; sometimes severe, 38:91.
Sebacina sp.: on 1 BC [1198].
Seimatosporium arbuti (Bonar) Shoem. (*Cryptostictis a.* (Bonar) Zeller): on 1 BC [1982].
Stereum hirsutum (Willd. ex Fr.) S. F. Gray and *S. ostrea* Blume & Nees ex Fr.: on 1 BC [1198].
Stictis radiata L. ex Pers.: on 1 BC [1198].

Arctagrostis Griseb.

GRAMINEAE

Perennial grasses, widespread in the arctic.

- A. latifolia* (R.Br.) Griseb. (*Colpodium latifolium* R.Br.), a circumpolar species. 1a, *A. l.* var. *arundinacea* (Trin.) Griseb. (*A. arundinacea* (Trin.) Beal).
- Apiospora parallela* (Karst.) Sacc.: on 1 Alaska [175, 1037].
Claviceps purpurea (Fr.) Tul.: on 1 Alaska [175, 1037], Frank [605]. Some of the specimens on which Linder based his report were examined by Savile and he found only nematode galls of *Anguina agrostis* (Steinbuch) Filip., not ergot sclerotia. For a recent summary see Mulvey [752a].
Darluca filum (Biv.-Bern.) Cast.: on rust (?*Puccinia pygmaea*, q.v.) on 1 Alaska [175, 1037].
Hendersonia arundinacea (Desm.) Sacc.: on 1 Greenl [601].
H. crastophila Sacc.: on 1 Greenl [603]; on 1a Alaska [1037].
Heterosporium phlei Gregory: on 1 Alaska [175, 1037].
Laestadea graminicola Rostr.: on 1 Greenl [899, p. 548].
Leptosphaeria herpotrichoides de Not.: on 1 Frank [52].
L. rousseliana (Desm.) de Not.: on 1 Greenl [899].
Mollisia graminis (Desm.) Karst.: on 1 Greenl [899]; probably the same as *Pyrenopeziza karstenii* Sacc., q.v. sub *Deschampsia*.
Mycosphaerella lineolata (Rob.) Schroet.: on 1 Frank [605].
M. recutita (Fr.) Johans.: on 1 Alaska [175, 1037].

- M. tassiana* (de Not.) Johans. (*Sphaerella t.* de Not.): on 1 BC [50], Frank [604, 903], Greenl [602, 603, 899, 901].
M. tassiana var. *arctica* (Rostr.) Barr: on 1 Frank [52].
M. wichuriana (Schroet.) Johans.: on 1 Alaska Frank [604].
Passalora graminis (Fckl.) Höhn (*Scolecotrichum g.* Fckl.): on 1 Alaska [175, 1037].
Platyspora pentamera (Karst.) Wehm. (*Pleospora p.* Karst.): on 1 Frank [903].
Pleospora arctagrostidis Oud.: on 1 Greenl [601].
P. herbarum (Fr.) Rabh. var. *h.* (*P. discors* (Dur. & Mont.) Ces. & de Not.): on 1 Greenl [602].
P. phaeocomoides (Berk. & Br.) Wint. var. *infectoria* (Fckl.) Wehm. (*P. i.* Fckl.): on 1 Greenl [602].
Puccinia pygmaea Erikss.: II III on 1, 1a Alaska [175, 1037], Mack 40:101; on 1a Alaska [15, p. 138].
Pyrenophora macrospora (Schroet.) Wehm. (*Clathrospora m.* (Schroet.) Nannf.): on 1 BC [50].
Ramularia pusilla Ung. (*Ovularia p.* (Ung.) Sacc. & D.Sacc.): on 1 Alaska [1037].
Selenophoma everhartii (Sacc. & Syd.) Sprague & Johnson: on 1 Alaska [1037].
Ustilago salvei Berk. & Br. (*U. striiformis* (West.) Niessl): on 1 Alaska [175, 1037].
Wettsteinina niesslii Müll. (*Leptosphaeria gigaspora* Niessl): on 1 Greenl [602].

Arctium L.

COMPOSITAE

Coarse biennial weeds, native to the Old World.

- A. lappa* L., great burdock, grande bardane; naturalized from Europe; in Canada in NB, Que, Ont and Man.
- A. minus* (Hill) Bernh., common burdock, petite bardane ou ciborroche; naturalized from Europe; known in every province, but most abundant in Eastern Canada.

- Lachnella canadensis* (Ell. & Dearn.) Seav.: on dead stems of 1 Ont [979, p. 265].
Peniophora cinerea (Fr.) Cke.: on dead stems of 2 Man [93, p. 77].
Phyllosticta lappae Sacc.: on ?1 Man [93, p. 135].
Pistillaria micans (Pers.) Fr.: on dead stems of 2 Man [93, p. 79].
Pleospora herbarum (Fr.) Rabh. var. *h.* (*P. armeriae* (Cda.) Ces. & de Not.): culture from leaves of *A.* sp. Ont. [1140].
Puccinia bardanae (Wallr.) Cda.: II III on 2 Man [93, p. 66], Que 34:97, NS [1138], Ont NS; records on 1 arise from misdetermination of the host [15, p. 349; cf. 828].
Septoria lapparum Sacc.: on 1, 2 Man [93, p. 135].

Arctophila Rupr.

GRAMINEAE

Widespread arctic, more or less aquatic, perennial grasses.

- A. fulva* (Trin.) Rupr. (*Colpodium fulvum* (Trin.) Griseb.).

Claviceps purpurea (Fr.) Tul.: on 1 Alaska [175, 1034, 1037].

Mycosphaerella pusilla (Auersw.) Johans.: on 1 Alaska [175, 1042]. The first record [175] is incorrect as it was based on material from an island off the Siberian coast [1042].

Pyrenophora macrospora (Schroet.) Wehm. (*Pleospora* m. Schroet.): on 1 Alaska [175, 1037].

Selenophoma everhartii (Sacc. & Syd.) Sprague & Johnson: on 1 Yukon [1042].

Arctostaphylos Adans.

ERICACEAE

Circumpolar and American shrubs.

1. *A. alpina* (L.) Spreng. (*Mairania a.* (L.) Desv.), foxberry, herbe à caribou; arctic regions to Nfld and alpine areas in Que, Me and NH and in Eurasia.
2. *A. columbiana* Piper; BC to Calif.
3. *A. uva-ursi* (L.) Spreng., common bearberry, bousserole ou raisin d'ours; arctic regions and south to Nfld, Que and BC.
4. *A. rubra* (Rehd. & Wils.) Fern.; Nfld and Que to Alta and Alaska.

Asteroma alpinum Sacc.: on 1 Greenl [899].

Chrysomyxa arctostaphyli Diet.: III on 3 BC [1198], BC Yukon Alta Sask [15, p. 36], Alaska [175], Ont [828], Que 60:44. Shown recently to be connected with *Peridermium coloradense* Arth. & Kern on *Picea*; the rust is unusual in the omission of II [841].

Exobasidium vaccinii Wor.: on 3 BC [1199], Sask Man [93, p. 64], Alaska [1038].

E. vaccinii var. *arctostaphyli* (Harkn.) Savile: on 3 BC [841, p. 649].

E. vaccinii var. *vaccinii* (*E. angustisporum* Linder): on 1 Mack Que [605]; on 1 Keew, 3 BC Alta [841].

Gibbera grumiformis (Karst.) Barr: on 1 Que [53, p. 314].

G. petrakii Müller: on 1 Que [53].

Guignardia vaccinii Shear: on 2 BC [50].

Leptosphaeria hyperborea (Fckl.) Berl. & Vogl.: on 1 Que [53].

Mycosphaerella minor (Karst.) Johans.: on 1 Frank [52].

M. tassiana (de Not.) Johans.: on *A. latifolia* Greenl [602]; the host is in error.

Pucciniastrum sparsum (Wint.) E.Fisch.: II III on 1, 4 Alaska [175]; on 1 Alaska BC [15, p. 18], Yukon F59:108, Mack F62:102, Alta F61:105; on 4 Man [93, p. 64], Ont [828].

Sphaeropezia vaccinii Rehm: on old leaves of 3 Man [93, p. 42].

Xenomeris raetica (Müll.) Petr.: on 1 Que [53].

Arenaria L.

CARYOPHYLLACEAE

Low, usually tufted, mostly perennial herbs, native to the temperate regions of the world; the cult. species are mostly perennial, used for mats and borders.

1. *A. dawsonensis* Britt.; in Labr, Nfld, Que, Ont, Alta and the Yukon.
2. *A. groenlandica* (Retz.) Spreng., mountain sandwort; in Greenl, Labr, Nfld, NS and Que.
3. *A. lateriflora* L. (*Moehringia l.* (L.) Fenzl); from Labr to Alaska, south to Nfld, NS and into the US.
4. *A. peploides* L. (*Halianthus p.* (L.) Fries, *Honkenya p.* (L.) Ehrh.), including 4a, *A. p.* var. *diffusa* Hornem., and 4b, *A. p.* var. *robusta* Fern.; Arctic coasts south to Nfld, Que and Ont, and in Alaska and Eurasia.
5. *A. physodes* Fisch. ex DC. (*Merkia p.* (Fisch.) Fisch.; Yukon, Alaska and e. Asia.
6. *A. rossii* R.Br. in Richards. (*Minuartia r.* (R.Br.) House); Greenl to Alaska.
7. *A. rubella* (Wahlenb.) Sm. (*A. verna* L. var. *r.* Wats., *Minuartia r.* (Wahlenb.) Graebn.); Arctic regions south to Nfld, Que and to the US and Eurasia.
8. *A. sajanensis* Willd. ex Schlecht. (*Alsine biflora* Wahlenb.); Que and the high Rocky Mts. to Ariz and Eurasia.
9. *A. stricta* Michx.; Que, Ont and south into the US.

Other hosts: 10, *A. arctica* Stev. (*Alsine arctica* (Stev.) Fenzl f. *scapigera*). 11, *A. capillaris* Poir. 12, *A. ciliata* L. 13, *A. macrocarpa* Pursh. 14, *A. microphylla* Phil. 15, *A. obtusifolia* (Rydb.) Fern. 16, *A. verna* L. (*Alsine v.* (L.) Wahlenb. f. *hirta*).

Ascochyta sp.: on 4 Alaska [175].

Cladosporium herbarum Lk.: on 16 Yukon [600].

Coniothyrium olivaceum Bon.: on 7 Greenl [603].

Leptopeziza groenlandica Rostr.: on 8 Greenl [899, p. 542].

Leptosphaeria stellariae Rostr.: on 1 Labr, 7 Frank [52]; on 8 Greenl [900].

Mycosphaerella confinis (Karst.) Lind: on 12 Greenl [603].

M. densa (Rostr.) Lind: on 6, 7 Frank [971].

M. dolichospora (Sacc & Fautr.) Wehm.: on 15 BC [50].

M. punctiformis (Pers. ex Fr.) Starb. var. *clematidis* Jaap: on 11 BC [50].

M. tassiana (de Not.) Johans. (*M. pachyasca* (Rostr.) Vesterg., *Sphaerella stellariancarum* (Rabh.) Karst., fide Lind [603]): on *A. spp.* BC [50]; on 2, 9 Greenl [899, 901]; on 4 Greenl [903]; on 6, 7 Greenl [602]; on 7 Frank [600, 604], Greenl [603]; on 8 Greenl [901]; on 12 Greenl [603].

M. tassiana var. *arctica* (Rostr.) Barr (*Laestadia a.* Rostr., *Sphaerulina a.* (Rostr.) Lind): on 4 Greenl [604, p. 73; 899, p. 547] on 4a Frank [52, p. 24].

M. tassiana var. *tassiana*: on 1 Labr, 6 Frank [52]; on 15 Que [53].

Arenaria

- Phoma herbarum* West.: on 4 Greenl [899].
Platyspora pentamera (Karst.) Wehm. (*Clathrospora p.* (Karst.) Berl.): on 7 Greenl [603].
Pleospora ambigua (Berl. & Bres.) Wehm.: on 6 Frank [52].
P. ambigua var. *crandallii* (Ell. & Ev.) Wehm.: on 15 BC [50].
P. cerastii Oud. (*Pyrenophora c.* (Oud.) Lind): on 7 Greenl [602, 603, 604]; on 13 Mack [604].
P. comata Auersw. & Niessl (*Pyrenophora c.* (Niessl) Sacc.): on 8 Greenl [899, 902]; on 12 Frank [903]; on 13, 16 Alaska [175]; on 16 Greenl [902].
P. helvetica Niessl: on 6, 7 Frank [52]; on 15 Que [53].
P. penicillus (Schm.) Fckl. var. *p.* (*Pyrenophora chrysospora* (Niessl) Sacc.): on 4 Greenl [900]; on 7 Mack [604]; on 7, 12 Greenl [603].
P. phaeocomoides (Berk. & Br.) Wint. (*P. vulgaris* Niessl): on 16 Yukon [600].
P. phaeocomoides var. *infectoria* (Fckl.) Wehm. (*P. i.* Fckl.): on 7 Greenl [602].
P. phaeospora (Duby) Ces. & de Not. (*Pyrenophora p.* (Duby) Sacc.): on 10 Yukon [600].
P. setigera Niessl (*Pyrenophora s.* (Niessl) Sacc.): on 7 Man [604].
P. tragacanthae Rabh.: on 14 BC [50].
Pseudopeziza cerastiorum (Wallr.) Fckl. var. *arenariae* Sacc.: on 3 Alaska [175].
Puccinia arenariae (Schum.) Wint.: on 3 Sask, 4 NS, 5 NWT [15, p. 236]; on 3 Que [8]; on 3, 5 Alaska [175]; on 3 Sask [93, p. 66]; on 4, 4b NS [1138]; on 5 Mack [250].
Selenophoma drabae (Fckl.) Petr. (*Rhabdospora d.* (Fckl.) Berl. & Vogl.): on 7 Greenl [602].
Septoria ammodeniae Dearn.: on 4 Alaska [175, 250].
Uromyces acuminatus Arth.: 0 I on 3 NS [1138]; the rust was shown by Fraser to be physiologically specialized to the aecial hosts [15, p. 168].
U. acuminatus var. *spartinae* (Farl.) Arth.: on 3 NS [15, 1138].
Ustilago violacea (Pers.) Roussel var. *stellariae* (Sow.) Savile: on 3 Ont [957, p. 284].
U. violacea inter var. *stellariae* and *violacea*: on 3 BC [957].

Arisaema Mart.

ARACEAE

Low perennial herbs with tuberous rhizomes, mostly native to tropical and temperate Asia, a few in N. America.

1. *A. dracontium* (L.) Schott (*Muricauda d.* (L.) Small), green dragon, dragon vert; in Canada in southern Que and Ont.
 2. *A. triphyllum* (L.) Schott (*A. atrorubens* (Ait.) Blume), jack-in-the-pulpit, oignon sauvage; in Canada from NB and Que to Man. 2a, *A. t.* var. *stewardsonii* (Britt.) Stevens (*A. s.* Britt.); in Canada in PEI, NS, NB and southern Que.
- Uromyces ari-triphylli* (Schw.) Sells (*U. caladii* Farl.): 0 I II III on 1 Ont, 2 Ont Que NS [15, p. 215]; on 1, 2 Ont [828]; on 2 NB NS, 2a NS [1138]; the systemic aecia are common.

Aristolochia L.

ARISTOLOCHIACEAE

Twining, climbing or sometimes upright perennial herbs or shrubs of tropical and warm regions; two commonly grown in greenhouses and one as a porch vine.

1. *A. durior* Hill (*A. macrophylla* Lam., *A. siphon* L'Her.), Dutchman's-pipe or pipevine; native to southeastern US, much cult. and locally naturalized in eastern US.

- Cercospora guttulata* Ell. & Kell.: on *A. sp.* NS [1138].
Diplodia radiculicola Tassi: associated with root rot of 1 cult. Ont 38:97.
Phyllosticta aristolochiae Tassi: on 1 cult. Que 33:106.
Sclerotinia sclerotiorum (Lib.) de Bary: cause of a stem rot of 1 cult. Lennoxville, Que 29:68.

Armeria Willd.

PLUMBAGINACEAE

Perennial herbs or subshrubs, forming low evergreen tufts or colonies, most abundant in the cooler half of the northern hemisphere and the Andes; useful for rock gardens and borders.

1. *A. maritima* (Mill.) Willd. (*A. vulgaris* Willd.), thrift or seapink, gazon d'Espagne, including 1a, *A. m.* var. *labradorica* (Wallr.) Lawr. (*A. l.* Wallr.), and 1b, *A. m.* var. *sibirica* (Turcz.) Lawr. (*A. s.* Turcz., *Statice armeria* L. f. *sibirica*); arctic regions of N. America and Asia.

Other host: 2, *A. elongata* Hoffm.

- Leptosphaeria hyperborea* (Fckl.) Berl. & Vogl.: on 1a Que [53].
Leptostroma herbarum (Fr.) Lk.: on 1b Greenl [899].
Mycosphaerella tassiana (de Not.) Johans.: on 2 Mack [604].
M. tassiana var. *tassiana*: on 1a Que [53].
Platyspora pentamera (Karst.) Wehm. (*Clathrospora p.* Karst.; *C. platyspora* and *Pleospora p.* sensu Rostr.): on 1 Greenl [603]; on 1b Mack [250], Greenl [900, 902]; on 2 Frank [604].
Pleospora comata Auersw. & Niessl (*Pyrenophora c.* (Niessl) Sacc.): on 1a Que [52]; on 1b Greenl [601].
P. herbarum (Fr.) Rabh.: on 1 BC [50]; on 1b Frank [903].
P. phaeocomoides (Berk. & Br.) Wint. var. *infectoria* (Fckl.) Wehm. (*P. i.* Fckl.): on 1 Greenl [603].
Rhabdospora pleosporioides Sacc.: on 2 Frank [604].
Septoria armeriae Allesch.: leaf spot, tache septorienne: on *A. sp.* Alaska, 1a Que, 1b Greenl 52:110.
Uromyces armeriae Lév. ex Kickx ssp. *hudsonicus* Savile & Connors: rust, rouille: on 1a Que [968, p. 190].
U. armeriae ssp. *pacificus* Savile & Connors: on 1 BC [968, p. 191].
Virus: yellows, jaunisse: on *A. (Statice) sp.*, cult. NB 32:88, 33:74.

Armoracia Gaertn., Mey. & Scherb.

CRUCIFERAE

Perennial herbs of the northern hemisphere; one cult. for its root, the source of the familiar condiment.

1. *A. lapathifolia* Gilib. (*Radicula armoracia* (L.) Robins.), horseradish, raifort; introduced from Europe into cult. and now escaped.

Albugo cruciferarum S.F. Gray (*A. candida* (Pers. ex Lév.) Ktze., *Cystopus candidus* (Pers. ex Lév.) de Bary): white rust, albugine ou rouille blanche: on 1 Que, first Canadian record, 43:51; severe in a commercial planting Ont 47:50.

Cercospora armoraciae Sacc.: brown leaf spot, tache brune: on leaves of 1 Alta 23:78, PEI [1138]; records unsupported by specimens in DAOM.

Ramularia armoraciae Fckl.; pale leaf spot, tache pâle: on leaves of 1 BC 44:46, Alta 34:107, 38:34, Sask Man Ont [93, p. 124], Que 41:36, NB PEI [1138].

Arnica L.

COMPOSITAE

Perennial herbs in the mts. and colder parts of the northern hemisphere, sometimes grown in rock gardens.

1. *A. alpina* (L.) Olin; Greenl to Alaska and BC; circumpolar. 1a, *A. a. ssp. angustifolia* (Vahl) Maguire; Que, Man, Keew, Mack and Alaska.
2. *A. amplexicaulis* Nutt.; Alaska to Mont and Calif.
3. *A. chamissonis* Less.; Alaska.
4. *A. cordifolia* Hook.; Alaska, Yukon to SD and Calif.
5. *A. latifolia* Bong.; Alaska and Yukon to Colo.
6. *A. louiseana* Farr, including 6a, *A. l. ssp. frigida* (Meyer) Mag. (*A. frigida* Meyer); Nfld, Que and Alta.
7. *A. mollis* Hook.; in Canada in Que, Alta and BC.

Diaporthe arctii (Lasch) Nit.: on 5 BC [50].

Didymella delphinii Earle: on stems of 5 BC [50].

Entyloma arnicale Ell. & Ev. (*E. calendulae* (Oud.) Frag., fide Fischer [292]; stat. conid. *Ramularia arnicalis* Ell. & Ev.): on *A. sp.* Alaska [292]; on 3 Alaska [175]; on 4 BC [946, p. 110].

E. compositarum Farl.: on 2 Alaska [1038].

Mycosphaerella tassiana (de Not.) Johans. (*M. pachyasca* (Rostr.) Vestergr.): on 1 Yukon [600, 604]; on 5 BC [50].

Nectria ?pedicularis (Tracy & Earle) Petr. (*Nectriella p.* (Tracy & Earle) Seaver): on 5 BC [50].

Pleospora helvetica Niessl: on 1 Frank [52].

P. herbarum (Fr.) Rabh.: on 1 Mack [250, 604], Frank [903], Greenl [899, 901].

P. penicillus (Schm.) Fckl. var. *p.* (*Pyrenophora chrysospora* (Niessl) Sacc.): on 1 Mack Frank [604].

Puccinia arnicalis Pk.: II III on 6a Alaska [175; cf. 15, p. 345].

Sphaerotheca fuliginea (Schlecht. ex Fr.) Poll. (*S. macularis* (Fr.) W.B.Cke. var. *f.* (Fr.) W.B.Cke.): on 1a Frank [971]; on 5 Alaska [175].

Unguicularia diaphana (Rehm) Höhn. (*Naevia d.* Rehm): on 1 Frank [604].

Uromyces junci (Desm.) Tul.: 0 I on 3 Alta [15, p. 217]; on 7 Alta 25:77.

Aronia Medic.

ROSACEAE

Deciduous shrubs of N. America.

1. *A. arbutifolia* (L.) Elliott (*Pyrus a.* (L.) L.f.), red chokeberry, petites poires; in Canada from NS to s. Ont.
2. *A. melanocarpa* (Michx.) Elliott (*Pyrus m.* (Michx.) Willd.), black chokeberry, gueules noires; in Canada from Nfld and NS to Ont.

Erwinia amylovora (Burr.) Winkl. et al.: fire blight was induced in 2 by spraying the flowers with a suspension of the bacterium Que 35:46. The infection persisted on the bushes, 43:80.

Gymnosporangium clavipes (Cke. & Pk.) Cke. & Pk.: 0 I on 1 NB [15, p. 362; 1138]; on 2 Ont [15], Que 32:64, NS [1138].

Isariopsis sp.: on 2 PEI [1138].

Podosphaera clandestina (Wallr. ex Fr.) Lév. (*P. oxycanthae* (DC.) de Bary): reported on 2 NS [1138].

Synchytrium vaccinii Thomas: on 1 NS [1138].

Arrhenatherum Beauv.

GRAMINEAE

Tall perennial grasses, of Eurasia and northern Africa.

1. *A. elatius* (L.) Mert. & Fisch., tall oatgrass, fromental; in Canada from Nfld to BC; cult. as a meadow grass in humid regions and often escaped from cultivation.

Claviceps purpurea (Fr.) Tul.: ergot, ergot: on 1 BC 54:53, [172].

Drechslera tritici-repentis (Died.) Shoem.: on *A. sp.* Alta [993].

Passalora graminis (Fckl.) Höhn. (*Scolecotrichum g.* Fckl.): brown stripe, strie brune: on 1 BC 34:26, [1034]; often heavy.

Puccinia graminis Pers.: stem rust, rouille de la tige: on 1 PEI 34:26, [1138].

Sclerotinia borealis Bubák & Vleugel: snow mold, moisissure nivéale: on 1 cult., Fort George, BC [377].

Ustilago avenae (Pers.) Rostr. (*U. perennans* Rostr.): smut, charbon: on 1 BC 23:38, 47:37, 50:45. From the symptoms on the respective hosts, Hille (Phytopath. Z. 32: 293-324, 1958) argues that *U. perennans* is distinct from *U. avenae*. He considers that a cross between the two species is not proven in the experiments of Fischer and Holton.

Artemisia L.

COMPOSITAE

Herbs or shrubby plants mainly of arid areas in the northern hemisphere, a few in western S. America; several grown for ornament, also for their medicinal and aromatic properties.

1. *A. arctica* Less., including *A. a.* ssp. *comata* (Rydb.) Hult.; arctic region from central Asia to Alaska-Yukon.
2. *A. biennis* Willd.; in Canada from NS and Que to BC.
3. *A. borealis* Pall.; arctic regions south to Nfld and Que.
4. *A. frigida* Willd.; from NB and Que to Sask and in Alaska.
5. *A. ludoviciana* Nutt., western mugwort or white sage, including 5a, *A. l.* var. *gnaphalodes* (Nutt.) Torr. & Gray (*A. g.* Nutt.); an aggressive weedy species; in Canada from NB and Que to BC.
6. *A. vulgaris* L., common mugwort, herbe Saint-Jean; naturalized from Europe; in Canada from Nfld and NS to Ont.

Other hosts: 7, *A. camporum* Rydb. 8, *A. cana* Pursh. 9, *A. caudata* Michx. 10, *A. forwoodii* Wats. 11, *A. glauca* Pall. (*A. dracunculoides* Pursh). 12, *A. hyperborea* Rydb. 13, *A. laciniata* Willd. 14, *A. longepedunculata* Rud. ex Bess. 15, *A. purshiana* Bess. 16, *A. richardsoniana* Bess. 17, *A. tilesii* Ledeb. var. *elatio*r Torr. & Gray. 18, *A. tridentata* Nutt.

Albugo tragopogonis (Pers.) S.F.Gray: on 2 Sask Man [93, p. 29].

Botrytis cinerea Pers.: on *A. sp.* Alaska [175].

Cylindrosporium artemiseae Dearn. & Barth.: on 5a Man [93, p. 129].

Erysiphe sp.: on *A. sp.* BC 24:77, [50].

E. cichoracearum DC. (*E. communis* Wallr. ex Fr.): on *A. spp.* Sask Man [93, p. 44], Man 44:104; on *A. sp.*, 1, 17 Alaska [175].

Heteropatella umbilicata (Pers. ex Fr.) Jaap (*Septoria cercosperma* Rostr.): on 3 Greenl [899].

Leptosphaeria pyrenopezizoides Sacc. & Speg.: on dead stems of 2 Sask [93, p. 54].

Lophiostoma caulium (Fr.) Ces. & de Not.: on 18 BC [50].

Mycosphaerella eriophila (Niessl) Dearn.: on 14 BC [50].

M. minor (Karst.) Johans.: on 3 Que [53].

M. tassiana (de Not.) Johans. (*M. pachyasca* (Rostr.) Vesterg.): on *A. sp.* Alaska [175]; on *A. sp.* Frank, 12 Mack [250]; on 6 BC [50]; on 16 Mack [604].

Ophiobolus acuminatus (Sow.) Duby and *O. fulgidus* (Cke. & Pk.) Sacc.: on dead stems of 2 Sask [93, p. 55].

Peronospora artemisiae-biennis Gäum.: on 2 Sask [93, p. 30].

P. ?sulfurea Gäum.: on *A. sp.* Man [93].

Phoma nebulosa (Pers.) Mont. in Berk.: on old stems of *A. sp.* Man [93, p. 134].

Phyllosticta sp. (?*Phoma ferruginea* Sacc.): on leaves of *A. sp.* Man 44:104.

Pleospora comata Auersw. & Niessl: on 3 BC [50].

P. herbarum (Fr.) Rabh.: on 3 Greenl [899].

P. penicillus (Schm.) Fckl. (*P. angustata* Wehm., *P. chrysospora* Niessl): on 1 Alaska [175, 604]; on 6 BC [50]; on 12 Mack [604].

P. phaeocomoides (Berk. & Br.) Wint. (*P. vulgaris* Niessl): on 3 Greenl [899]; on 16 Mack [250].

P. rainierensis Wehm. (*P. asymmetrica* Wehm.): on 14 BC [50].

Puccinia artemisiae-norvegicae Tranz. & Woron.: on 1 Alaska [175].

P. atrofusca (Dudl. & Thompson) Holw.: rust, rouille: 0 I on 2, 7, 11 Sask, 5a Alta Sask Man, 15 Sask [93, p. 66]; on 2, 4, 7, 9, 15 Alta, 5a Man [15, p. 205]; on 10 Alta 25:15.

P. millefolii Fckl.: III on 4 BC [15, p. 206], Man [93, p. 69]; on 13, 17 Alaska [175].

P. tanacetii DC. (*P. absinthii* DC): rust, rouille: II III on 4, 8, Sask, 5a Man Ont [93, p. 65]; on 4 Alta Sask, 5 BC [15, p. 343]; on 5 Ont, sub *P. ludoviciana* Fabr. [828]; on 11 BC [1198].

Rosellinia ovalis (Ell.) Sacc.: on 18 BC [50].

Strickeria obducens (Fr.) Wint.: on 18 BC [50].

Wettsteinina mirabilis (Niessl) Höhn.: on 3 Que [53].

Aruncus Adans.

ROSACEAE

Tall, essentially herbaceous perennials of the northern hemisphere.

1. *A. sylvester* Kostel (*A. vulgaris* Raf.); western N. America and Eurasia.

Ramularia ulmariae Cke.: on 1 Alaska [175].

Asarum L.

ARISTOLOCHIACEAE

Stemless perennial herbs of the northern hemisphere.

1. *A. canadense* L., wild ginger, gingembre sauvage; in Canada from Que to Man.
2. *A. caudatum* Lindl.; from BC to Calif.

Puccinia asarina Kunze: III on 2 BC [15, p. 229].

Asclepias L.

ASCLEPIADACEAE

Perennial herbs of N. and S. America and Africa, a few planted in wild gardens or borders.

1. *A. incarnata* L., swamp milkweed; in Canada in NS and from Que to Man.
2. *A. syriaca* L., common milkweed, herbe à coton; in Canada from NB to Sask; early carried from America to southern Europe and supposed by Linnaeus to have come from the Orient.

Cercospora clavata (Gerard) Cke. (*C. incarnata* Ell. & Ev.): on leaves of 1 and its f. *albiflora* Ont, on 2 Man Ont, very common and widespread in Ont

43:26; on 2 Man [93, p. 114], although first determined as *C. illinoensis* Barth., 33:98.

Colletotrichum fusarioides (Ell. & Kell.) O'Gara: on stems of *A. sp.* Man [93, p. 129]; on 2 cult. Man 44:29.

Coniothyrium sp.: on 2 cult. Man 44:29.

Fusarium spp: *F. acuminatum* Ell. & Ev. was isolated from discolored basal parts, and *F. oxysporum* Schlecht. and *F. solani* (Mart.) App. & Wr. from apparently healthy roots of 2 Man [335].

Mollisia asclepiadis Ell. & Ev.: on dead stems of *A. sp.* Ont [979].

Phyllosticta cornuti Ell. & Kell.: on 2 Man; possibly the microconidial state of *Cercospora clavata* (q.v.) [93, p. 135].

Uromyces asclepiadis Cke: II III on 1, 2 Ont 43:27, [15, p. 324]. Only the II and III states are known; however, the rust appears not to overwinter in Canada, reinfection taking place each year from wind-borne spores from the US.

Aster yellows virus (callistephus virus 1): aster yellows, jaunisse de l'aster: on 2 Ont, experimental evidence indicated that it was distinct from cucumber mosaic virus, 43:27.

Asparagus L.

LILIACEAE

Perennials, with leaves reduced to fine scales and foliage consisting of green leaflike branchlets, one cult. for its edible shoots, and others, erect or climbing vines, from S. Africa, grown for decoration.

1. *A. officinalis* L. var. *altilis* L., asparagus, asperge; the cult. form of a perennial nearly prostrate herb of seacoasts of Europe and Asia; grown in gardens and commercially for use fresh or for canning.
2. *A. asparagoides* (L.) Wight; 'smilax' of florists, S. Africa.
3. *A. plumosus* Baker, asparagus fern; commonly cut in strands for decoration, S. Africa.
4. *A. sprengeri* Regel; commonly cult., S. Africa.

Alternaria sp.: isolated from severely defoliated seedlings of 1 Ont 42:37.

Botrytis cinerea Pers.: weakly parasitic on 1 Man [93, p. 113]; sclerotia on overwintered stalks of 1 NS 40:29, [1138]; on 2 Alaska [175].

Erwinia carotovora (L.R.Jones) Holland: soft rot, pourriture molle: decay of shoots of 1 Ont 34:28, or of crown PEI 43:41, [1138].

Fungi from seed: of 1: *Alternaria tenuis* auct. sensu Wiltshire, BC; *Aureobasidium pullulans* (de Bary) Arn., Ont; *Cladosporium cladosporioides* (Fres.) De Vries, *Epicoccum nigrum* Lk., BC [374]. *Fusarium avenaceum* (Fr.) Sacc., *F. equiseti* (Cda.) Sacc., *F. oxysporum* Schlecht., BC [334]. *Mucor hiemalis* Wehmer, *Oospora lactis* Fres., *Stemphyllum botryosum* Wallr., BC [374].

Fusarium spp: crown rot, pourriture fusarienne: on 1 BC 50:47, Sask 32:32, Man 38:27, Ont 46:32; usually only a few stalks affected, but these severely injured; organisms rarely determined to species; recorded are *F. oxysporum* Schlecht. (*F. bulbigenum* Cke. & Massee), Sask. 33:21, and *F. oxy-*

sporum, Alta 45:45, Man 44:37; also ? on 3 Ont 34:80; on 4 Man 38:97.

Fusarium spp.: from affected plants of 1: *F. equiseti*, Man; *F. oxysporum*, Sask Man Ont; *F. oxysporum* var. *redolens* (Wr.) Gordon, Man [335]. From berries of 1, *F. acuminatum* Ell. & Ev., Man 44:37.

F. oxysporum Schlecht. var. *redolens* (Wr.) Gordon: seedling blight, brûlure des plantules: first observed on 1 in 1945, Ont 45:45. Very destructive to young stands but it occurs only sporadically as a cortical rot of the roots; the pathogen was readily isolated from soil of mature asparagus plantings; only some strains of the fungus were pathogenic, 49:38, [342]; possibly present in BC, 50:47.

Puccinia asparagi DC.: rust, rouille: on 1 interior BC 35:24, Sask Man [93, p. 66], Ont 20:37, Que 24:32, NB 25:40, NS 39:35, PEI 25:40, [1138]; [cf. 15, p. 225; 828]; occasionally severe, 38:27. For this reason the resistant cultivars Martha Washington and Mary Washington are recommended and new cultivars should be thoroughly tested for their resistance to rust before they are licensed; the rust is sometimes almost completely parasitized by *Darluca filum* (Biv.-Bern.) Cast.; aecia are rarely observed; for description of the urediniospores, see [963].

Rhizoctonia crocorum (Pers.) DC.: violet root rot, rhizoctone violet: on 1; "destroyed 35 percent of the plants of Mary Washington in a garden at Saanichton," BC 35:24.

R. solani Kühn: rhizoctonia, rhizoctone commun: reported as the cause of damping-off of 1 NB 29:24, and of a severe root rot Ont 46:32.

?Nonparasitic, physiologique: fasciation, fasciation: on 1 Man 40:29, Que 38:27, NB 40:47; not common.

Frost injury: severe on 1 in Toronto-Hamilton, Ont 56:48.

Rusty tips: cause unknown: on 1 BC 23:72, Ont Que NB 22:49; not recorded in recent years.

Asplenium L.

POLYPODIACEAE

Mostly evergreen ferns native to many regions of the world; very few commonly cult.

1. *A. nidus* L., bird's-nest fern, langue de bœuf; native to Asia and Polynesia.

Phyllosticta pteridis Halst.: on 1 in greenhouse, Que 41:87; also recorded on *Ancimia densa* Lk., *A. rotundifolia* Schrad., *Coniogramme japonica* (Thunb.) Diels., *Lygodium circinatum* (Burm.) Sw., *Phymatodes muscifolium* Bl.

Aster L.

COMPOSITEAE

Mostly perennial herbs of the temperate zone, particularly abundant in N. America; a number cult. as border plants for summer and autumn bloom.

1. *A. acuminatus* Michx.; in Canada from Nfld, NS to Que and Ont.
2. *A. ciliolatus* Lindl. (*A. lindleyanus* Torr. & Gray); in Canada from Que, NS to northern BC.
3. *A. cordifolius* L.; in Canada from NS and NB to Que and Ont.

Aster

4. *A. dumosus* L.; apparently known in Canada only under cult.
5. *A. ericoides* L. (*A. multiflorus* auct., not Ait.); from Eastern Canada to BC.
6. *A. foliaceus* Lindl. ex DC.; in Canada in Labr, NS, NB and Que and in Alaska. 6a, *A. f. var. apricus* Gray (*A. a.* (Gray) Rydb.).
7. *A. junciformis* Rydb. (*A. junceus* auct. not Ait.), from PEI, NB and Que to Alaska.
8. *A. laevis* L.; in Canada from Que to Sask.
9. *A. lateriflorus* (L.) Britt., wireweed; in Canada in NS and Ont.
10. *A. macrophyllus* L.; in Canada in NS, Que and Ont.
11. *A. novae-angliae* L., New England aster; in Canada from Que to Alta.
12. *A. novi-belgii* L.; in Canada from Nfld and NS to Que.
13. *A. prealtus* Poir. (*A. salicifolius* Ait., not Lam.); in Canada from Que to Man.
14. *A. tataricus* L.f., introduced from n.e. Asia and escaped from cult. in the New England states.
15. *A. tradescanti* L.; in Canada from Nfld, NS to Que and Ont.
16. *A. umbellatus* Mill.; Nfld to Ont and Alta.

Other hosts: 17, *A. conspicuus* Lindl. 18, \times *A. frikartii*. 19, *A. johannensis* Fern. 20, *A. longulus* Sheld. 21, *A. lowrieanus* Porter. 22, *A. occidentalis* (Nutt.) Torr. & Gray. 23, *A. patens* Ait. 24, *A. pilosus* Willd. 25, *A. ptarmicoides* (Nees) Torr. & Gray. 26, *A. puniceus* L. 27, *A. sagittifolius* Wedem. 28, *A. sedifolius* L. 29, *A. simplex* Willd. (*A. paniculatus* Lam.). 30, *A. subspicatus* Nees (*A. douglasii* Lindl.) 31, *A. vimineus* Lam. var. *?foliolosus* (Ait.) Gray.

Basidiophora entospora Roze & Cornu: downy mildew, mildiou: on 2 BC [535]; on 3 Ont 45:108; on 11 Ont 37:72; epidemic on cult. 11 Ottawa, Ont 43:102, NS 52:110; on 12 cult. Ont 43:103; on 30 BC 50:121.

Ceratobasidium anceps (Bres. & Syd.) Jackson: on 10 Ont [495]

Cercospora cana Sacc.: on 3 Man [93, p. 115].

Coleosporium asterum (Diet.) Syd. (*C. solidaginis* Thüm.); red rust, rouille rouge: II III on 50 species of *Aster* in US and s. Canada [15, p. 44]; on 2 BC [1198], Ont 33:107; on 2, 3, 5, 9, 11, 13, 29 Man, 8 Sask [93, p. 63]; on 3 Man Ont 23:123; on 3, 9, 10, 12, 16, 23 NS [1138]; on 4 cult. Que 56:123; on 6 BC [1198], Ont [828]; on 6a cult. BC 38:97; on 8 Alta 34:97, Man 24:78; on 10 Ont [828]; on 11 Ont 31:119, Que 35:65; on 12 Que 32:100; on 12 cult. but not on 11 in the same garden Ont

43:107; on 15 Ont 33:107; on 16 Ont [828], Que 54:97; on 17 BC [535, 1198]; on 30 BC [535]; on 18, imported seedlings BC 37:72; on 22 BC [535]; on 29 Ont 33:107; also on 21, 24, 25, 26, 28 cult., 31 Ont [828].

Cuscuta gronovii Willd.: dodder, cuscute: on ?11 Man 43:103, 44:105; caused injury to or death of plants.

Dasyscyphus sulfureus (Pers.) Masee (*Peziza s.* Pers.): on old stems of *A. spp.*, etc., Man [93, p. 39].

Diaporthe arctii (Lasch) Nit.: on stems of *A. spp.* NS [1138].

Entyloma compositarum Farl.: smut, charbon: on *A. sp.* NB [1138]; on 8 Man [93, p. 61; 946, p. 110].

E. polysporum (Pk.) Farl.: on 10 Ont 43:107, [946, p. 109].

Erysiphe cichoracearum DC. ex Méral: powdery mildew, blanc: on *A. spp.* BC [50], Que 25:77, NB 33:107, NB NS [1138]; on *A. spp.* Sask, 2, 11 Man [93, p. 44], on 4 cult. Que 46:81; on 11 cult. BC 34:80, Que 41:87, 43:103; on 12 cult. Man 42:97, Ont Que 43:103; on 20 Sask 31:119.

Fasarium conglomerans Wr. (cf. *F. oxysporum* Schlecht. f. *callistephi* (Beach) Snyder & Hans.): although reported on *A. spp.* NS [1138], almost certainly the correct host is *Callistephus*.

Leptosphaeria doliolum (Pers.) de Not.: on dead stems of *A. spp.* Man [93, p. 54], Que [53]; on *A. sp.*, 10 NS [1138].

L. planiuscula (Riess) Ces. & de Not.: on stems of *A. spp.* NS [1138].

Montagnella heliopsidis (Schw.) Ell. & Ev.: on old stems of *A. sp.* Man [93, p. 47].

Mycosphaerella tassiana (de Not.) Johans.: on 17 BC [50].

Nectria pedicularis (Tracy & Earle) Petrak: on *A. sp.* Que [53].

Ophiobolus fulgidus (Cke. & Pk.) Sacc.: on dead stems of *A. spp.* Man [93, p. 55].

Phialea cyathoidea (Bull.) Gill.: on old stems of *A. spp.* Man [93, p. 41].

Pleospora herbarum (Fr.) Rabh. var. *occidentalis* Wehm.: on *A. sp.* BC [50].

Puccinia asteris Duby (*P. cnici-oleracei* Pers. ex Desm., fide Hylander et al. [490]): brown rust, rouille brune: III on 36 species of *Aster* in Canada and US [15, p. 202]; on *A. spp.* NB NS [1138]; on *A. sp.* Mack 40:101, Que 34:97; on 1 Que [197]; on 1, 3 Ont 31:118; on 2 BC [1198]; on *A. spp.*, 8 Sask, 2, 5, 11 Man, 3 Ont [93, p. 66]; on 5, 10, 26 Ont [828]; on 6 Alaska [175]; on 9, 10 NS, common [1138]; on 11 Ont 43:103; on 17 BC [1198].

P. dioicae P. Magn. (*P. extensicola* Plowr., *P. e. var. asteris* (Thüm.) Arth.): 0 I on *A. spp.*, common in southern Canada and Alaska [15, p. 197]; on *A. sp.* cult., 1 NS; infection induced on 1 by Fraser by inoculation with teliospores from *Carex trisperma* [1138]; on *A. spp.* Sask Man, 25 Man [93, p. 68]; on 1, 2, 3, 10, ?19, 26, 27, 29 Ont [828]; on 2 Que 33:107; on 2, 22 BC [1198]; on 3 Que 32:101; on 8 Man 33:107.

Ramularia asteris (Phill. & Plowr.) Bubák: blight, brûlure ramularienne: on *A. sp.* cult. severe, 5 Man 44:105; on ?11 Man [93, 124].

Septoria atropurpurea Pk.: leaf spot, tache septorienne: on *A. spp.*, 2, 3, 8, 12 cult., 14 cult. Man [93, p. 137]; on 29 Man 43:107.

Uromyces junci (Desm.) Tul.: rust, rouille: 0 I on 2 Sask, 10 Ont [15, p. 216], [cf. 828].

U. silphii Arth.: 0 I on 10 Ont [828; cf. 15, p. 219].

?Virus: blight, brûlure: on 12 Ont 43:103.

Astragalus L.

LEGUMINOSAE

Mostly perennial herbs of the northern hemisphere, occurring commonly on the prairies. The plants are a distinct hazard to grazing animals because they become poisonous through the accumulation of selenium in their tissues when they are growing in soil containing the element. Several are ornamental, but they are rarely cult.

1. *A. alpinus* L.; arctic regions and south to Nfld, NB and Que.
2. *A. canadensis* L., little rattlepod; in Canada from Que to BC.
3. *A. frigidus* Nutt., a circumpolar species. 3a, *A. f.* var. *littoralis* (Hook.) Wats.
4. *A. goniatus* Nutt.; in Canada from Man. to Alta.
5. *A. striatus* Nutt. (*A. adsurgens* Hook., non Pall.); dry prairies, Man and west.
6. *A. umbellatus* Bunge (*Phaca frigida* L.); n. Yukon and Alaska.

Other hosts: 7, *A. bisulcatus* (Hook.) Gray. 8, *A. campestris* Gray. 9, *A. elegans* Hook. 10, *A. glareosa* Dougl. 11, *A. occidentalis* (Wats.) M. E. Jones (*A. macounii* Rydb.). 12, *A. pectinatus* Dougl. 13, *A. mortonii* Nutt. 14, *A. purshii* Dougl. (*A. mollissimus* Torr.). 15, *A. richardsonii* Sheld.

Asterella hellebori Rehm: on 11 BC [50].

Asteromella pichbaueri Petrak: on 1 Frank [962].

Ciccinobolus cesatii de Bary: on *Erysiphe polygoni* on 1 Alaska [1038].

Erysiphe polygoni DC. ex Mérat: on 1 Alaska [1038]; on 3a Yukon [600].

Fusicladium sp.: on 1 Alaska [1038].

Mycosphaerella spinarum (Auersw.) Migula: on 1 Que [52].

M. tassiana (de Not.) Johans. (*M. pachyasca* (Rostr.) Vestegr.): on *A. spp.* BC [50]; on 1 Alaska [175, 250]; on 1, 3a, 9 Yukon, 1 Frank [600].

M. tassiana var. *arctica* (Rostr.) Barr: on 1 Que [52].

M. tassiana var. *tassiana*: on 1 Frank [52].

Peronospora astragali Syd.: on 2 Man [93, p. 30].

P. trifoliorum de Bary: on 1 Alaska [983, 1038].

Phoma astragali Oud.: on 1 Yukon [600].

P. astragali Cke. & Harkn.: on stems of 12 Sask [93, p. 134].

Physalospora aurantia Ell. & Ev.: on leaves of 4, 5, 12 Sask [93, p. 55]; on 25 Sask 32:100.

P. megastoma (Pk.) Sacc.: on 21 Man, 7 Sask [93]; on 14 Alta 34:97; the two species are referred to *Polystigma astragali* (Lasch) Höhn. by Weiss & O'Brien [3].

Platyspora permunda (Cke.) Wehm. (*Clathrospora p.* (Cke.) Sacc.): on 8 BC [50].

Pleospora ambigua (Berl. & Bres.) Wehm.: on *A. sp.* Labr [52].

P. coloradensis Ell. & Ev.: on 8 BC [52].

P. comata Auersw. & Niessl (*Pyrenophora c.* (Niessl) Sacc.): on 3a Yukon [600].

P. helvetica Niessl: on 1 Frank Labr [52].

P. herbarum (Fr.) Rabh.: on 3 Alaska [175].

P. phaeocomoides (Berk. & Br.) Wint. (*P. vulgaris* Niessl): on 6 Frank [250].

P. rainierensis Wehm. (*P. asymmetrica* Wehm.): on 10 BC [50].

P. tragacanthae Rabh.: on 1 Que [52].

Septoria psammophila Sacc.: on 12 Sask [93, p. 139].

Sphaerotheca fuliginea (Schlecht. ex Fr.) Poll. (*S. macularis* (Wallr. ex Fr.) Magn. var. *f.* (Fr.) W.B.Cke.): on *A. sp.* Alaska [175].

Thecaphora deformans Dur. & Mont.: on pods of 7 Sask [957].

Uromyces lapponicus Lagerh.: on *A. sp.* Alaska [52]; on *A. sp.*, 11 Alta, 6 NWT (115° W, 69° N) [15, p. 302]; on 1 Alaska [1038]; 0 I (as *U. phacae-frigidae*) on 6 Yukon Mack [250]; III on 15 Cambridge Bay NWT [962].

U. phacae-frigidae (Wahl.) Hariot: III on *A. sp.* Alaska [15, p. 303]; on *A. sp.*, 6 Alaska [175].

†Alfalfa witches'-broom virus: alfalfa witches'-broom, virose-balai de sorcière: on 13 BC 50:24.

Athyrium Roth

POLYPODIACEAE

Herbaceous ferns, mostly in the northern hemisphere.

1. *A. felix-femina* (L.) Roth s. l., Lady fern, fougère femelle, including *A. cyclosorum* Rupr.; across Canada from Nfld to BC and in Alaska; also in Eurasia and Africa. 1a, *A. felix-femina* var. *michauxiana* (Spreng.) Farw. (*A. angustum* (Willd.) Presl); in Canada in NS and from Que to Man.

Botrytis cinerea Pers.: on *A. sp.* Alaska [175].

Ceratobasidium anceps (Bres. & Syd.) Jackson: on 1a Ont [495].

Uredinopsis longimucronata Faull (sub *U. struthiopteridis* Stoerm., p.p.): II¹ II² and III on 1, 1a Alaska [175]; on 1a Ont Que NB NS [289], NS [1138], Man [93, p. 64], [cf. 15, p. 4; 828].

U. longimucronata f. *cyclosora* Faull: II¹ II² III on 1 BC Alta [289], BC [1198].

Atriplex L.

CHENOPODIACEAE

Annual and perennial woody herbs and shrubs, widely distributed, growing on arid plains and in saline soils; the abundant saltbush of western and southwestern US; one grown as a potherb and another as a hedge.

1. *A. hortensis* L., orach or Hungarian spinach, arroche; introduced from Asia and spread from cult. in Que and in the New England and other states.
2. *A. patula* L. 2a, *A. p.* var. *hastata* (L.) Gray; in Canada from Nfld and NS to BC.

Cercospora dubia (Riess) Wint.: caused a leaf spot on *A. sp.* Sask [93, p. 114]; on 1 Brandon, Man 39:32.

Puccinia aristidae Tracy: 0 I on *A. sp.* Sask [93, p. 114; cf. 15, p. 157].

Atriplex

Uromyces peckianus Farl.: 0 I on 2, 2a NS; teliospores from *Distichlis* used by Fraser to infect *Atriplex* successfully [1138; 15, p. 160].

Atropa L.

SOLANACEAE

Herbs of the Old World; one of economic importance as a source of atropine, etc.

1. *A. belladonna* L., belladonna, belladonne; native to Eurasia.

Botrytis cinerea Pers.: on berries of 1 Que 56:123.

Avena L.

GRAMINEAE

Annual and perennial grasses of the temperate regions, including the important cereal, the cult. oat.

1. *A. fatua* L., wild oat, folle avoine; widely distributed annual weed, introd. from Europe, very troublesome in grain fields of Western Canada.
2. *A. hookeri* Scribn. (*Helictotrichon h.* (Scribn.) Henr.); perennial, known from Man to Alta and south into the US.
3. *A. nuda* L., hulless oat, avoine à grua; mostly of our cult. hulless cultivars are crosses with or selections from *A. sativa*.
4. *A. sativa* L., common oat, avoine; introd. from Eurasia; there are numerous cultivars.

Other hosts: 5, *A. brevis* Roth. 6, *A. sterilis* L. 7, *A. stibosa* Schreb.

Alternaria spp. (*A. tenuis* auct. sensu Wiltshire): associated with head and culm discoloration of 4 Que NB 40:10, NB 41:9, 42:8; probably in part secondary to *Leptosphaeria avenaria* (q.v.).

A. tenuis: a common isolate from blighted spikelets of 4 NB NS PEI 38:13.

Asterocystis radialis de Willd. (*Olpidiaster r.* (de Willd.) Pascher): a normal inhabitant of soils in Sask. Although found in the finer roots of cereals, only under most favorable conditions might it cause significant damage and then only in 4, 29:11, [1100]; on roots of 4 Sask [93, p. 29]; not distinct from *Olpidium brassicae* (q.v.).

Bipolaris sorokiniana (Sacc. in Sorok.) Shoem. (*Helminthosporium sativum* Pamm., King & Bakke): root rot, piétin helminthosporien: frequently reported as the cause of foot and root rot of 4 Sask Man 30:17, [93, p. 120], Alta 31:15, but the main pathogens are believed to be *Fusarium* spp., primarily *F. culmorum* (q.v.); isolated from 35 of 165 samples of the 1940 crop, 41:10, [cf. 374]; rarely isolated from panicles affected by head blight NS 39:19.

B. victoriae (Meehan & Murphy) Shoem. (*Helminthosporium v.* Meehan & Murphy): Victoria blight, helminthosporiose: appeared suddenly in cultivars of 4 carrying Victoria resistance to *Puccinia coronata*; first noted at Ames, Iowa, in 1944; on 4 BC Man Ont Que NB NS PEI 47:8, Ont [404], Alta 50:8; fungus carried to a limited extent on the seed, 50:8. Later studies have indicated that while sus-

ceptibility to Victoria blight is governed by a single dominant gene, resistance to only some races of crown rust is governed solely by a single major gene linked with susceptibility to Victoria blight [1147].

Botrytis cinerea Pers.: isolated from panicles of 4 affected by head blight, NB NS PEI 38:13, NS [1138].

Bullera alba (Hanna) Derx: from rusted straw of 4 Man [93, p. 60].

Chaetomium spp.: from seed of 4, *C. aureum* Chivers, *C. globosum* Kze., *C. ochraceum* Tschudy, Que; *C. cochliodes* Pall., Ont Que; *C. olivaceum* Cke. & Ell., *C. spinosum* Chivers, N. Ireland; on culms of 4, *C. cochliodes*, a common species on a wide variety of substrata [1009].

Claviceps purpurea (Fr.) Tul.: ergot, ergot: on 1 Man, 2, 4 Sask [93, p. 45]; on 4 BC 30:19, Alta 27:19, Ont 56:6, Que 54:8, PEI 50:7; rare on *Avena*, recorded from the prairies, 1953-55, only on 1 Alta 55:50, 4 Alta 53:9, Man 55:7, [cf. 172].

Colletotrichum graminicola (Ces.) G.W. Wilson: anthracnose, anthracnose: causes a disease associated with conditions of low or unbalanced soil fertility and grass-cereal culture [1144]; on 4 Sask 23:17, [93, p. 129], Alta Que 39:19, Ont 42:8, PEI [1138]; cause of a rather severe root rot of 4 about Edmonton, Alta 33:8, 34:11, [928]; noticeable flare-up in Sask 44:7, 45:8; sclerotium bodies on the subcrown internode and base of culm are a useful diagnostic symptom [928].

Cryptosporium graminis Robinson & Ayers: on roots of 4 PEI [890].

Curvularia geniculata (Tracy & Earle) Boedijn (*Helminthosporium geniculatum* Tracy & Earle): on 4 Man [93, p. 120].

Drechslera avenacea (Curt. ex Cke.) Shoem. [922, p. 880] (*Helminthosporium avenae* Eidam; stat. perf. *Pyrenophora chaetomioides* Speg., *P. avenae* Ito & Kurib.): leaf blotch or stripe, rayure des feuilles: on leaves of 1 Sask, 4 Sask Man [93, p. 120]; on 4 Alaska [175, 1037], BC Alta Que 31:16, Alta Sask Man 57:24, Ont 24:11, Nfld 57:5, [cf. 993]. The disease was widespread in 1937-39 in NB NS PEI and infection was sometimes severe, 37:10 et seq.; the narrow parallel-sided lesions serve to distinguish them from those of *Leptosphaeria avenaria* (q.v.), 39:19; the seedling-blight stage has rarely been observed, 42:9, 57:5, but it is probably prevalent in cool wet springs in the Atlantic Provinces. Forty-seven seed samples of 4 collected in Que carried an infection of 0 to 56%, average 15%, 42:9; fungus lost its viability slowly in seed of 4 in storage [638]; the perfect state has been collected in Ont DAOM 55527 [993; cf. 1144].

Epicoccum neglectum Desm.: on 4 Alaska [175].

E. nigrum Lk. (*E. purpurascens* Ehrenb.): on 4 PEI [1138].

Erysiphe graminis DC. ex Méral: powdery mildew, blanc: on 4 BC 30:19, [50], Alta 50:17, Ont 51:13, Que 23:17, NB 41:10, [1138], NS 56:6, PEI 55:7; frequent in BC and Eastern Canada; physiologic specialization not observed in the limited experiments conducted [182, 1144].

Fungi from seed: of 4: *Acremonium atra* (Cda.) Sacc., Ont; *Alternaria consortialis* (Thüm.) Groves & Hughes, Canada; *A. tenuis* auct. sensu Wiltshire, *Ascochyta sorghi* Sacc., *Bipolaris sorokiniana* (Sacc. in Sorok.) Shoem., *Cladosporium cladosporioides* (Fres.) De Vries, *Drechslera avenacea* (Curt. ex Cke.) Shoem., *Epicoccum neglectum* Desm., Ont [374]. *Fusarium acuminatum* Ell. & Ev., *F. avenaceum* (Fr.) Sacc., *F. culmorum* (W.G.Sm.) Sacc., *F. equiseti* (Cda.) Sacc., *F. graminearum* Schwabe, *F. moniliforme* Sheld., *F. oxysporum* Schlecht., *F.*

- poae* (Pk.) Wr., *F. sambucinum* Fckl. ff. 1 and 6 Wr., *F. scirpi* Lamb. & Fautr., *F. semitectum* Berk. & Rav. var. *majus* Fr., Man [332]. *F. lateritium* Nees, once from eastern Canada [333]. *Papularia arundinis* (Cda.) Fr., *Rhizopus arrhizus* Fischer, Ont [374].
- Fusarium* spp.: from parts of the growing or maturing plants of 4: *F. acuminatum*, *F. arthrosporioides* Sherb., Man; *F. avenaceum*, BC Man Ont Que NS; *F. culmorum*, *F. equiseti*, Man NS; *F. graminearum*, Ont Que NS; *F. oxysporum*, *F. o.* var. *redolens* (Wr.) Gordon, Man; *F. poae*, Man NB NS PEI; *F. sambucinum*, *F. sporotrichioides*, Man [335].
- Fusarium* spp.: root rot, fusarirose: usually attributed to joint action of *F.* spp. and *Bipolaris sorokiniana*, a common disease of 4 in Alta Sask Man; *F.* spp. appear to be regularly associated with the disease and may be the prime cause. In 1921 a severe root and foot rot of 4 was observed in Sask, a fungus identified as *F. culmorum* was isolated and the isolates produced a pronounced seedling blight when seed was germinated on inoculated soil [998]. The injury is most conspicuous when plants suffer from prematurity blight; head blight is common in NB NS PEI 38:13. Considerable differences in cultivar reaction to *F. culmorum* have been demonstrated in field and greenhouse tests, e.g. Victory is moderately resistant whereas Banner is susceptible [1144].
- Gelasinospora cerealis* Dowding: from diseased crown of 4 Man [93, p. 48; 263].
- Gibberella zeae* (Schw.) Petch. (stat. conid. *Fusarium graminearum* Schwabe): mature perithecia on straw of 4 Ont 53:9, [335].
- Gliocladium roseum* (Lk.) Bainier: on 4 Alta [1034].
- Gloeosporium bolleyi* Sprague: root necrosis, nécrose des racines: isolated from 4 Ottawa, Ont 41:6; only record: see *Triticum*.
- Heterodera avenae* Wr. (*H. schachtii* Schmidt sensu lat.): oat nematode, nematode de l'avoine: cause of a destructive disease of cereals especially 4; first recognized in 1933 in Simcoe County, Ont, 34:12; well described and illustrated by Putman & Chapman [862]. Although later reported to be widespread in Ont, it is known with certainty only in counties between Waterloo and Peterborough, where it is prevalent in many fields, 42:9, 54:xvi, 55:xiv. In seasons favorable for the crop little injury is apparent, but the nematode population builds up rapidly, whereas, in dry early seasons partial or complete failure of the crop may occur, but the number of nematodes falls, 43:8. Disease appears to have declined after practice of proper rotation, 49:xiv; rarely observed beyond the original area, 55:xiv.
- Heterosporium avenae* Oud.: on 4 Sask [1034].
- H. ?maculatum* Klotzsch: on 4 Ont 44:8.
- Leptosphaeria avenaria* Weber f. sp. *avenaria* (stat. imperfect, *Septoria avenae* Frank f. sp. *avenae*): septoria leaf blotch or black stem, septorose: both states recorded at Brandon, Man 23:17 and Saskatoon, Sask; also perithecia on old stubble, Indian Head, Sask [93, p. 54, 137]; leaf blotch phase noted in Que NB 31:16, Ont Que NB NS PEI 39:19, BC 42:11, Alta 44:10. About 1950 the black stem phase appeared, 52:9, and the pathogen was recognized as the cause of a major disease of 4 in Ont Que and the Maritime Provinces [191]. Ascospores constitute the major source of primary inoculum, first suggested by Shaw [984]; at Ottawa mature ascospores were present in early June and first symptoms of infection appeared 10 days later on the upper leaves; maximum ascospore discharge occurred in late June and then declined; macrospores are important only in secondary spread of the pathogen [192]; ascospore discharge in PEI was somewhat later, 58:4, 16. Isolated from seed [Groves in litt.], but extent or importance of seed infection unknown. Although isolates vary in pathogenicity, race differences have not been detected [191]; fungus varies in culture [507]. Most cultivars of 4 are susceptible, only a few being moderately tolerant; greater resistance is found in other species of *Avena* [193].
- L. culmicola* (Fr.) Auersw.: on old straw of 4 Man [93, p. 54].
- Mycosphaerella tassiana* (de Not.) Johans.: on 4 Alaska [175].
- Nigrospora sphaerica* (Sacc.) Mason: on 4 Sask [1034].
- Olpidium brassicae* (Wor.) Dang., rootlet necrosis, nécrose des racelles: on 4 Sask [1034].
- Ophiobolus graminis* Sacc. (*O. cariceti* (Berk. & Curt.) Sacc.: take-all, piétin-échaudage: on 4 BC [50].
- Passalora graminis* (Fckl.) Höhn. (*Scolecotrichum g.* Fckl.): brown stripe, strie brune: on 4 Alta 50:9, Ont 48:7.
- Pratylenchus pratensis* (De Man) Filipjev: meadow nematode, nématode des prés: on 4 Ont 42:9. The penetration and development in oat roots were described by Hastings [420a]. It now seems that the nematode called *P. pratensis* by Thorne and others in N. America is *P. crenatus* Loof.
- Pseudomonas coronafaciens* (Ch. Elliott) Stev. (*Bacterium c.* Ch. Elliott): halo blight, tache aréolée: reported on 4 from every province except Nfld and annually in one or more provinces; also Mack, 40:101. Early reports primarily based on symptoms, which are not always reliable, but later ones often confirmed by isolation of the bacterium, 39:18. First noted in Alta Sask 20:17; varies in severity from year to year, 41:10; possibly attributable to weather conditions, 56:7. A natural epidemic brings out differences in cultivar reaction, Alta [7], Man 29:14, Que 31:15. Main cultivars grown in Canada are resistant to *P. coronafaciens* and *P. striafaciens* (q.v.) [1144], but apparently new strains of the pathogen may severely affect cultivars previously considered resistant, 48:6. A specific bacteriophage of the organism isolated from seed of 4 [1066]; for antibiotic activity of soil microorganisms toward the bacterium, see [832].
- P. striafaciens* (Ch. Elliott) Starr & Burkh. (*Bacterium s.* Ch. Elliott): stripe blight, strie bactérienne: first recorded on 4 in Alta, 31:15, and mainly reported from Alta Sask Man; diagnosis confirmed by isolation of the organism by Hagborg for Sask Man, 52:9; on 1 Alta Sask, 4 Man, infection usually only slight to moderate [93, p. 28]; evidently much less common than *P. coronafaciens* (q.v.).
- Puccinia coronata* Cda.: crown rust, rouille couronnée: within *P. coronata* sensu lat., Fraser & Ledingham [312] distinguished four "varieties"; grasses in the Prairie Provinces play little or no part as hosts of their var. *avenae* (*P. coronata* f.sp. *avenae*, q.v.), with 0 I on *Rhamnus cathartica* and II III on *A.* spp. cult. and 1. In trials heavy normal infection occurred on 1, 3, 4, 5, 6, 7 and *Lamarckia aurea* (L.) Moench (*Achyrodes aureum* (L.) Kuntze), but 2, *Trisetum flavescens* (L.) Beauv. (*A. flavescens* L.) and *Schizachne purpurascens* (Torr.) Swallen (*A. striata* Michx.) were immune; on 1 Sask, 4 Sask Man [93, p. 67]; on 4 NB NS PEI [1138].
- P. coronata* Cda. f.sp. *avenae* Erikss. & Henn.: of real economic importance in Eastern Canada, where severe losses have occurred, and in Man and Sask, where losses occur in epidemic years, but of rare occurrence in BC and Alta 20:5 et seq., [842]. *Rhamnus cathartica* may sometimes be heavily rusted in Sask 22:11, and Man 22:13, but localized

spread is rarely observed, 33:13, and epidemic outbreaks arise chiefly from air-borne urediniospores from the south, 43:8. Localized epidemics near buckthorns, usually escapes, occur frequently in Ont 30:13 et seq., and in NB and NS 39:17; under these conditions crown rust suppresses the growth of the whole plant rather than destroying it after most of its growth is completed as with stem rust. Although localized epidemics occur less frequently than those of stem rust, when they do occur they are more extensive; in escape areas oats cannot be grown profitably. Unlike the barberry, little has been done to eradicate the European buckthorn and some heavy infestations are known in eastern Ont [752]; in Man today buckthorn is more prevalent than barberry, which was almost eliminated in the '20's [59, 500]. Between 1929 and 1934 in Canada Peterson [842] identified 11 races, which varied widely in prevalence and distribution and the race picture changed little until 1952, 52:21, when the numbers of races or subraces annually identified increased from 9-15 to 30-35 until in 1959, 59:14, most of the crown rust present was pathogenic to commonly grown oat cultivars. Although aecia from *Rhamnus cathartica* collected in Eastern Canada yielded predominantly f. sp. *avenae*, other ff. spp. were also present, 52:23, [cf. 845]. Mature plant resistance to one or more races was reported in some cultivars of oats [843]; only one major gene for resistance to crown rust in Victoria is associated with susceptibility to Victoria blight [1144, 1147].

Puccinia graminis Pers. f. sp. *avenae* Erikss. & Henn.: stem rust, rouille de la tige: common from Man eastward, less common in BC and Sask and rather rare in Alta on 4; on 1 Alta Sask 55:50; on 1, 4 Sask Man [93, p. 68]; on 1 PEI 29:74, on 4 NS [1198]. Until rust-resistant cultivars were available, stem rust was often destructive in the 'rust area' of southern Sask and Man 24:10; in favorable seasons it may cause some loss in Alta where susceptible cultivars are still grown, 55:8; from Ont eastward losses were said to be heavy only in late seasons, but closer observations revealed that damage occurred frequently from localized epidemics centered about plantings and escapes of *Berberis vulgaris*, 37:8, 39:15, 40:12. From a study of the effect of rust infection on yield Greaney [351] estimated that for the years 1929-34, the average loss from stem rust on oats in Man and Sask was over 8,000,000 bu, valued at \$2,000,000. Of the 12 races identified between 1921 and 1943, races 1, 2 and 5 comprised the bulk of the stem rust in Canada, especially in the Prairie Provinces; races with a wide range of pathogenicity are usually first detected in Eastern Canada, where the barberry is present. In 1943 races 8, 10 and 11 became widely distributed [773]; in 1957, 15 races were identified in N. America [1145], and since then two more races have appeared, 59:14. The barberry is not only an important breeding ground for new races, 46:16, but also is "effective in multiplying scarce virulent races once they appear in trace amounts on otherwise resistant varieties," 47:20. Races contain both homozygous and heterozygous lines and when the latter are selfed they tend to produce races more virulent than the parent race whereas in crosses between races virulence is usually recessive. The normal red color of the urediniospore was dominant over orange and maternal or cytoplasmic inheritance was observed [522]; genetic analysis of F₂ urediniospore populations revealed a good agreement between the actual and expected ratios [506]. Although uredinial development is less vigorous at temperatures above optimum for rust development, stem rust is more tolerant of the temperature than *P. coronata* f.sp.

avenae [520]. Inheritance of resistance in 4 to stem rust has been under constant study [1147, 1145]; in 1958 four major genes (A, B, D, E) and probably a fifth (C) had been found to govern resistance to certain groups of races; more recently the F gene has been discovered [1146]. Experiments to elucidate the mechanism of resistance in oats to this rust suggest that "the inhibition arises from the interaction of the rust mycelium and the host cells," but the nature of the inhibition was not ascertained [152].

Pythium graminicola Subram. (*P. arrhenomanes* Drechs. var. *canadensis* Vanterpool & Truscott): browning root rot, piétin brune: on 4 Alta Sask [1034], ?Man 33:9; disease not only injurious to wheat but also to oats, 44:5, 10; other species, such as *P. debaryanum* Hesse may be present, 52:9; from 1 Sask 33:20, 34:7, [93, p. 31].

P. volutum Vanterpool & Truscott: on 4 Sask [93, 1034].

Selenophoma donacis (Pass.) Sprague & Johnson var. *stomaticola* (Bäuml.) Sprague & Johnson: on 1 Sask 51:7.

Ustilago avenae (Pers.) Rostr.: loose smut, charbon nu: on 4 in every province in Canada [292], including Nfld, 49:xx, and in Alaska [175, 1037]; on 1 Sask 31:119, [292]; on 1 cult., 5 Que 42:11. Formerly *U. avenae* and *U. kolleri* (q.v.) were two of the most destructive cereal smut organisms, 24:10, the former being less prevalent and destructive than the latter, e.g. in 1937 in 166 fields surveyed in NB NS and PEI, average smut infection was 2%; *U. avenae*, highest infection 35%, was found in 22, *U. kolleri*, highest infection 35%, in 42, and both smuts in 43 fields, 37:9. Loss from oat smuts in Canada was estimated in 1927 to be 3.4% of the crop, or \$6,773,000 [392], and a partial estimate in 1939 indicated little change, 39:7. With the introduction of smut-resistant cultivars smut infection in Man declined from a peak of 6.4% in 1942, 42:11, to 1.7% in 1950, 50:9, to traces in recent years; in Sask the level has fallen from 2 to near 1% and in Alta from 1 to 0.75%, probably a reflection of the smaller acreages in susceptible cultivars in these provinces although a higher proportion of the seed is being treated, 59:24. Ten races of *U. avenae* and two races of *U. kolleri* have been differentiated in Canada, races of the latter being stable while those of *U. avenae* are more variable in pathogenicity. Resistance has been incorporated from several sources into cultivars such as Garry and Rodney [1144].

U. kolleri Wille (*U. hordei* (Pers.) Lagerh. sensu lat., *U. levis* (Kell. & Swingle) Magnus): covered smut, charbon couvert: on 1 Sask, 4 BC Alta Sask NWT Man Ont Que NB NS [292]; on 1 Sask, 4 Sask Man [93, p. 62]; on 4 Alaska [175, 1037], NB NS PEI [1138]; more prevalent and destructive than *U. avenae* (q.v.). Cultivar resistance was evident in trials with a composite collection of *U. levis* [7]; in a cross Black Mesdag × Victory segregation for smut resistance among F₂ families suggested that resistance was conditioned by two genes, one dominant and one less potent supplementary gene, thus confirming previous work by others [503].

U. reticulata Liro: field observations indicated that contamination of grain of 4 with spores from smut-infected plants of *Polygonum scabrum* (q.v.) in the same field was common in NB NS PEI, 37:ii, 9, and Que, 45:12.

Xanthomonas translucens (Jones, Johnson & Reddy) Dowson ff. spp. *cerealis* Hagbog and *hordei-avenae* Hagborg: produce infections on *A. spp.* following wound inoculations [396].

Barley yellow dwarf virus: red leaf, feuilles rouges: observed for several years in eastern Ont; in 1958

about 15 percent of 4 and *Hordeum vulgare* and a lower percentage of *Triticum aestivum* grown in the Ottawa Valley developed symptoms by mid-July. The bird cherry aphid, *Rhopalosiphum padi* (L.), from diseased oat plants proved infective on Clinton oats and appeared responsible for yellow dwarf infections in oats; the virus severely stunted the plants and sharply reduced yields when young plants were inoculated, 58:17, [1027]. In 1959 the virus was much less prevalent in oats although perennial grasses, such as *Phleum pratense*, were demonstrated to be potential reservoirs of the virus in the Ottawa area; also, *R. padi* was seldom found in spring grains until late summer, but the English grain aphid, *Macrosiphum avenae* (Fabr.), after a prolonged flight into the area, was the vector associated with the first BYDV infections in spring grains, 59:19, [1028]. Probably BYDV was widespread in e. Ont and Que and in plots in NB NS and PEI in 1950, 50:10, or as false stripe, Ont 30:18, or bronze leaf, NS 40:14; recorded also in Alta 54:14, Alta Sask 55:10 [cf. 1030].

Wheat streak mosaic virus: on 1, 4 Alta [1018]; traces on 4 Alta 54:10.

Magnesium deficiency: crop chlorotic and stunted; was generally present on 4 throughout the potato-growing areas of NB 35:10; also in PEI 43:11, 44:11. The condition was found to be correlated with low levels of available magnesium and was corrected by application of magnesium sulphate to the soil or as a spray [1067].

Manganese deficiency, carence de manganèse: gray speck, tache grise: on 4 Ont Que 23:18, Ont 41:12, Man 44:11, Sask PEI 49:8, Alta NS 60:45. The disorder is most easily diagnosed early in the season, when light green or gray spots develop on the leaves as growth reaches the 4th or 5th leaf stage. Recognition of its occurrence has been slow, but it is now known to occur in widely scattered localities, as in Man, 53:10. Most frequent on naturally calcareous or over-limed soils high in organic matter [1144]; both the mineral constitution and the microflora of the soil appear to play vital parts in determining the availability of manganese and thus indirectly to be responsible for the appearance or absence of the disorder. Control is readily obtained with dilute sprays of manganese sulphate on the foliage when symptoms first appear, but is rarely achieved by soil amendments [659, 660]; cultivars vary greatly in their resistance to the disorder [1144].

Nonparasitic: blast, coulure: a condition of common occurrence recorded almost every year from one or more provinces, as in Alta Sask Man NB PEI 33:9, Nfld 49:xx; blasting of the spikelets appears to be the normal response of the plant to hot weather. Blast develops 6-8 weeks after seeding and is reduced by plentiful moisture and light during the period [259; cf. 513].

Nonparasitic: frost banding, étranglement chlorotique: as a result of freezing temperatures just as the first blades are emerging from the soil chlorotic bands are occasionally formed, sometimes successively on the same leaf, on 4 Alta 36:10, NB 35:10.

Axyris L. CHENOPODIACEAE

Mostly pubescent annuals, native to Russia and Asia.

1. *A. amaranthoides* L., Russian pigweed, chou-gras de Russie; native to Asia, occurs in all provinces except Nfld; an abundant weed in the Prairie Provinces.

Diplodina ellisii Sacc.: a form or species very similar to this fungus on old 1 Man [93, p. 133].

Balsamorhiza Nutt. COMPOSITAE

Perennial herbs of plains and foothills of the western United States and Canada.

1. *B. sagittata* (Pursh) Nutt., balsam-root; in Alta and BC.

Mycosphaerella tassiana (de Not.) Johans.: on *B. sp.* BC [50].

Pleospora phaeocomoides (Berk. & Br.) Wint. (*P. vulgaris* Niessl var. *vulgaris*): on *B. sp.* BC [50].

Puccinia balsamorhizae Pk.: 0 II III on 1 BC [15, p. 342; 1198].

Barbarea R.Br. CRUCIFERAE

Biennial and perennial herbs mostly native to Europe and N. America.

1. *B. vulgaris* R.Br., yellow rocket, barbarée vulgaire ou herbe de Sainte-Barbe; adventive from Europe, especially common in Eastern Canada in meadows and pastures.

Plasmodiophora brassicae Wor.: on 1 PEI 37:49, 44:79, [1138].

Bartsia L. SCROPHULARIACEAE

A small genus of perennial herbs in Europe and northern Africa but contains an amphiatlantic arctic-alpine species.

1. *B. alpina* L., velvet bells; in Greenl and eastern subarctic Canada and south to n. Nfld and n. Ont.

Asteroma bartsiae Rostr.: on 1 Greenl [899, p. 570]; a *Sporonema*, stat. conid. of *Leptotrochila bartsiae* Schüepp [973, p. 244].

Botrytis cinerea Pers.: on 1 Greenl [900].

Helotium cyathoides (Bull. ex Fr.) Karst.: on 1 Greenl [900].

H. nigrescens (Cke.) Rehm: on 1 Greenl [901].

Heteropatella umbilicata (Pers. ex Fr.) Jaap (*Septoria cercosperma* Rostr.): on 1 Greenl [899].

Mollisia atrata (Pers.) Karst.: on 1 Greenl [899].

Phoma bartsiae Rostr.: on 1 Man [604].

Phoma irregularis Rostr.: on 1 Greenl [900].

P. sceptri Karst.: on 1 Greenl [899].

Placosphaeria bartsiae Masee: on 1 Greenl [902].

Sclerotium rufum Rostr.: on 1 Greenl [901].

Beckmannia Host GRAMINEAE

Rather tall, erect grasses of cool and temperate N. America and Eurasia.

1. *B. syzigachne* (Steud.) Fern. (*B. erucaeformis* auct. Amer., nec (L.) Host), slough grass;

Beckmannia

w. Que to Alaska and also in some states of the US and in Asia.

Colletotrichum graminicola (Ces.) G. W. Wilson: on 1 Man [93, p. 129].

Drechslera tritici-repentis (Died.) Shoem.: on 1 Alta [933].

Erysiphe graminis DC. ex Mérat: on *B. sp.* Alaska [175]; on 1 Alaska [1037], Sask Man [93, p. 44].

Puccinia coronata Cda.: II III on 1 Alta 34:97, Sask Man [15, p. 153; 93, p. 67]; moderately susceptible to 'vars.' *avenae*, *bromi* and *calamagrostis*, but immune to 'var.' *eleagni* when inoculated with aeciospores of the respective 'varieties' [312].

Ustilago salvei Berk. & Br. (*U. striiformis* (West.) Niessl): on 1 Man [93, p. 62], Alta Man [292].

Begonia L.

BEGONIACEAE

A large group of cultivars derived from succulent herbs of tropical origin. The specific names below refer to groups of related forms rather than botanical species. They correspond approximately to the horticultural types of begonias, as fibrous, rhizomatous and tuberous rooted [3].

1. *B. semperflorens* Lk. & Otto.

2. *B. rex-cultorum* Bailey.

3. *B. tuberhybrida* Voss.

Other hosts: 4, *B. socotrana* Hook.f. 5, *B. undine*. 6, *B. wallichiana* Steud.

Agrobacterium tumefaciens (Sm. & Towns.) Conn: crown gall, tumeur du collet: infection severe on tuber of 3 Man 59:86.

Aphelenchoides fragariae (Ritz.-Bos) Christie: leaf nematode, nématose foliaire: on *B. sp.* BC 35:65, Ont 55:119, Que 47:104.

Botrytis cinerea Pers. or *B. sp.*: gray mold, moisissure grise: on *B. sp.* Alaska [175], Que 52:110; on 2 NB 30:85, [1138]; on 3 BC 49:101, Sask 40:121, Que 51:110, PEI 39:101; causes a blight or rot of flowers, leaves and stems, 51:110, and cuttings 56:123.

Cercospora sp.: leaf spot, tache des feuilles: on *B. sp.* NB 29:66.

Erysiphe cichoracearum DC. ex Mérat (or *E. polyphaga* Hammarlund): powdery mildew, blanc: cf. 48:105; on *B. sp.* BC 58:112, Alta 50:121, Sask Ont 48:105; on 3 Alta 53:114, Ont Que 51:110, NB 54:129; on 4 Que 40:121; very destructive in 1955 on 3. Three applications of Karathane (dinitrocapryl phenyl crotonate), strength as recommended by manufacturer, at 3-day intervals controlled the disease, 55:119.

Fusarium equiseti (Cda.) Sacc.: isolated from diseased tubers of 3 Man [335].

Gloeosporium begoniae Magnaghi. [*Colletotrichum gloeosporioides* Penz.]: anthracnose, anthracnose: slight infection on *B. sp.* Que 58:112.

Meloidogyne sp. (*Heterodera marioni* (Cornu) Goodey): root-knot nematode, nodosité des racines: on *B. spp.* BC 49:102.

M. incognita (Kofoid & White) Chitwood: on *B. sp.* Sask on plants brought from Eastern Canada 2 or 3 years previously, 56:123.

Xanthomonas begoniae (Buchw.) Dowson.: bacterial leaf spot, tache bactérienne: on *B. sp.* Ont. 46:81, Que 47:104, NS 51:110, BC 54:129, Alta 55:119; pathogenicity proved by inoculation, 52:110.

Aster yellows virus (callistephus virus 1): aster yellows, jaunisse de l'aster: on 5, 6 Que 43:103.

Tomato spotted wilt virus (lycopersicum virus 3): spotted wilt, tache de bronze: on *B. spp.* Man Que 45:108.

Virus: ring spot, tache annulaire: on 3 Ont 57:122.

Oedema, œdème: physiological, physiologique: on *B. spp.* Que 57:123.

Belamcanda Adans.

IRIDACEAE

Two perennial rhizomatous herbs native to China and Japan, one often planted and partly naturalized in N. America.

1. *B. chinensis* (L.) DC., blackberry lily, morée de Chine.

Heterosporium iridis (Fautr. & Roum.) Jacques (conid. state of *Didymellina macrospora* Kleb.): leaf spot, tache hétérosporienne: on 1 Man 42:97; infection lighter than on most irises Ont 43:103.

Bellis L.

COMPOSITAE

Small annual or perennial herbs native to Europe and the Mediterranean region; one long cult.

1. *B. perennis* L., English daisy, petite marguerite; native to western Europe, grown in flower gardens and often escaping in lawns.

Botrytis cinerea Pers.: on *B. sp.* Alaska [175].

Berberis L.

BERBERIDACEAE

Deciduous or sometimes evergreen shrubs cult. for their ornamental foliage, flowers and fruits, native to N. and S. America, Europe, N. Africa and Asia.

1. *B. thunbergii* DC., Japanese barberry, épinevinette de Japon; native to Japan; because of its immunity to the formae speciales of *Puccinia graminis* in N. America, this species is now widely cult. for ornament in place of the susceptible *B. vulgaris*.

2. *B. vulgaris* L., common barberry, épinevinette; native to Europe and e. Asia, formerly extensively cult. for ornament in the north-eastern and north central states in the US and in Ont eastward in Canada; now largely eradicated in the north central states and the Prairie Provinces, but much less thoroughly so in other parts of the US and Canada.

Other hosts: 3, *B. aggregata* Schneid. 4, *B. brachypoda* Maxim. 5, *B. heteropoda* Schrenk.

6, *B. poireti* Schneid. var. *weichangensis*. 7, *B. sibirica* Pall. 8, *B. tischeleri* Schneid.

?*Dothidella berberidis* (Wahl.) Theiss. & Syd.: canker, chancre: on 9 BC 41:111.

Phyllosticta berberidis Rabh.: leaf spot, tache foliaire: on 1 Que 47:116, 48:104.

P. japonica Thüm.: on 1 Alaska [175].

Pseudomonas berberidis (Thornb. & Anderson) Stapp: bacterial leaf spot, tache bactérienne: on 1 Ont 31:96, Que 52:111; may be more general in Canada than reported [cf. 3].

Puccinia graminis Pers. (stat. aecid. *Aecidium berberidis* Gmel.): cluster cup rust, rouille: 0 1 on 2 BC Ont NS 23:117, Alta 29:66, Sask 22:1, Man 20:11, Que PEI 24:54, NB 25:69. Plantings or escapes are often the center of localized epidemics of stem rust in oats in NB, NS and PEI, 37:72, and similar centers are known in Ont and Que. A concerted effort was made to eradicate 2 in Alta, Sask and Man 1920-1923 [500]; a resurvey in 1957 revealed few bushes now present in Man [59]. Such an effort was initiated in 1964 in Eastern Canada, where eradication had been confined to limited areas and in consequence some rather severe infestations of the shrub occur [cf. 601, 752]. Aecia have also been reported on other *B. spp.*, e.g., abundant on 5 and a few on 3, 4, 6, 7, 8 in the Botanical Gardens, Montreal, Que, 44:103; similarly at Ottawa, Ont, 34:80; some nurseries still contain susceptible barberries, 56:118, 57:116.

Verticillium spp.: wilt, flétrissure verticillienne: apparently sporadic but often causing severe damage especially to 1 Ont 37:72, PEI 45:108; at least in part caused by *V. albo-atrum* Reinke & Berth. [690].

Bergenia Moench

SAXIFRAGACEAE

Perennial herbs producing large clumps or colonies, native mostly to mountainous regions in Asia; some cult. for ornament.

1. *B. cordifolia* (L.) Sternb. (*Saxifraga c. L.*).

Phyllosticta sp.: leaf spot, tache foliaire: on 1 Man 34:91, apparently distinct from species already described, 44:105.

P. ?saxifragarum Allesch.: on 1 Man 45:108.

Beta L.

CHENOPODIACEAE

Annual, biennial and perennial herbs native to Europe, N. Africa and Asia; one species widely cult.

1. *Beta vulgaris* L.; cultigen, presumably derived from *B. maritima* L., a native of the coasts of Europe, and comprised of distinct agronomic groups as follows:

1a, garden beet, betterave potagère; widely cult. especially in market gardens.

1b, sugar beet, betterave à sucre; in limited areas in s. Alta, Man, Ont and Que for processing and in BC for seed.

1c, mangel, batterave fourragère; for fodder particularly in NB, NS and PEI.

1d, *B. v.* var. *cicla* (L.) Moq., Swiss chard, poirée; for greens in home gardens.

The diseases on garden beet and sugar beet were not always kept separately when recorded.

Agrobacterium tumefaciens (Sm. & Towns.) Conn: crown gall, tumeur du collet: rare on scattered roots of 1b BC 32:52, Alta 33:17; more frequent on 1c NB 23:79, PEI 36:17 et seq., [1138]; and general on rare occasions on 1a BC 38:29, 51:41; tumors showed marked metabolic activity that affected the whole root [763].

Aphanomyces cochlioides Drechs., *Pythium aphanoder-matum* (Edson) Fitzp., *P. ultimum* Trow and *Rhizoctonia solani* Kühn: root rot, pourriture des racines: these fungi are associated with root rot of 1b in s.w. Ont; *A. cochlioides* causes black root, racine noire, in clay soils, *P. aphanoder-matum* a seedling blight, pourriture pythienne, in sandy loam and the other two fungi occur mostly in clay soil and are less frequent.

In s.w. Ont, where in 1949 some 30,000 acres of 1b yielded 300,000 tons of roots valued at \$46 million, black root rot is an important limiting factor in production. It appears as most of the seedlings are emerging. The hypocotyl turns black and rapidly collapses, the attack being most pronounced under a hot sun after a rain when the soil is thoroughly moist. The disease attracted most attention in the '40's and the peak outbreak occurred in 1944 when almost 700 acres were reported a complete loss and stands in other fields were spotty at harvest [443]. It is worse in some 800 acres of heavy, closely compacted soils low in organic matter, 45:37, where *A. cochlioides* is the main pathogen.

Seed treatment protected only against preemergence damping-off [449]. However, thiram mixed with the usual fertilizer greatly reduced the amount of black root if the mixture was well placed near the seed [452]. Also, borax added to the fertilizer markedly reduced the disease [443].

In s. Alta, black root causes some damage each year, 49:33 et seq., but the disease incidence is lower than in Ont; also *A. cochlioides* plays a lesser role even when most prevalent, 51:35.

Armillaria mellea (Vahl ex Fr.) Kummer: associated with stunting of 1c in a field NB 35:18.

Ascochyta betae Prill. & Del.: on a few leaves of 1a BC 42:39, [535].

Botrytis ?cinerea Pers.: associated with storage rot of 1c Que 31:29.

Cercospora beticola Sacc.: leaf spot, tache cercosporéenne: on 1a BC 35:25, Alta 37:24, Man to PEI 24:33, Man [93, p. 114], NB to PEI [1138]; on 1b BC Alta Ont 35:19; on 1c BC Ont Que 35:18, NB 37:18, NS 38:12, PEI 25:46, NB to PEI [1138]; on 1d Ont 36:40. A common disease in the '30's, often destructive on 1b in Ont 35:19; later of little importance, 44:34, possibly because of resistant cultivars, but it has again increased in Ont with the shift to monogerm seed cultivars, 59:36; sometimes heavy on seed crops Man 41:30, Que 42:39; continuous cropping may result in damaging outbreaks, 57:53.

?*Cornebacterium fascians* (Tilf.) Dowson: fasciation, fasciation: on 1b BC [535]; on 1c NB PEI 41:22 et seq.

Cuscuta sp.: dodder, cuscute: on 1a Ont 44:34; on 1b Alta 56:43.

- Erwinia carotovora* (L. R. Jones) Holland: soft rot, pourriture molle: on *1a* NB 27-28:57, [1138]; on *1c* Que 36:17, PEI 39:30.
- Fungi from seed: *Acremoniella atra* (Cda.) Sacc., *A. verrucosa* Togn., *1* BC; *Alternaria consortialis* (Thüm.) Groves & Hughes, *1* BC, *1c* NB; *A. tenuis* auct. sensu Wiltshire, *1* BC, *1c* Que; *Aspergillus flavus* Lk., *1* Calif; *A. repens* (Cda.) de Bary, *1d* Netherlands; *Aureobasidium pullulans* (de Bary) Arn., *1* BC, *1c* NB, *1d* Ont [374]. *Bipolaris sorokiniana* (Sacc. in Sorok.) Shoem., *1*, *1d* Man [374], *1c* Man [1138]. *Chaetomium elatum* Kze. & Schm., *1* NJ; *C. globosum* Kze., *1c* NB, *1d* Calif; *C. indicum* Cda., *1d* Netherlands; *C. murorum* Cda., *1* Que, *1d* Calif; *C. succineum* Ames, *1* Calif; *Cladosporium cladosporioides* (Fres.) De Vries, *1c* NB, *1d* Pa; *C. malorum* Ruehle, *1* BC; *Epicoccum neglectum* Desm., *1* Ont, *1c* NB, *1d* Wash [374]. *F. acuminatum* Ell. & Ev., *1a* Man; *F. avenaceum* (Fr.) Sacc., *1c* Que PEI; *F. culmorum* (W.G.Sm.) Sacc., *1b* BC; *F. equiseti* (Cda.) Sacc., *1a* Man, *1c* Que, *1d* Ont; *F. oxysporum* Schlecht., *1* Mich, *1c* Ont; *F. poae* (Pk.) Wr., *1a* Man; *F. sambucinum* Fckl. var. *coeruleum* Wr., *1c* PEI [334, 374]. *Gelasinospora retispora* Cain, *1d* Netherlands; *G. tetrasperma* Dowding, *1b* BC, *1c* Que; *Helminthosporium biseptatum* Sacc. & Roum., *1* Scotland; *Melanospora zamiae* Cda., *1c* PEI; *Nigrospora sphaerica* (Sacc.) Mason, *1* BC, *1d* Wash; *Oospora lactis* Fres., *1d* Mich; *Papularia arundinis* (Cda.) Fr., *1* Ohio, *1c* NB, *1d* Conn; *P. sphaerosperma* (Pers.) Höhn., *1* Minn; *Periconia byssoidea* Pers., China; *P. pycnospora* Fres., *1* Man; *Petriella asymmetrica* Curzi, *1* BC; *Sordaria fimicola* (Rob.) Ces. & de Not., *1* Ont, *1c* PEI, *1d* Netherlands; *S. inaequalis* Cain, *1* Calif, *1d* Ill; *S. setosa* Wint., *1* BC; *Trichoderma viride* Pers. ex Fr., *1d* Ont; *Tripterospora longicaudata* Cain, *1d* Ont; *Verticillium albo-atrum* Reinke & Berth., *1* Minn, *1c* NB; *V. dahliae* Kleb. *1* BC [374].
- Fusarium* spp.: from plants: *F. equiseti* (Cda.) Sacc. from discolored roots of *1b* Man, *F. oxysporum* f. *betae* (Stewart) Snyder & Hansen from diseased seedlings of *1c*, 90% of which were killed in the field NS [335].
- Heterodera schachtii* Schmidt: sugar-beet nematode, nématode de la betterave: this important nematode is known from three widely separated localities in the sugar beet area of s.w. Ont, in single fields at Glencoe, 42:33, [146] and Joannette Creek, 50:xiv, and in the Blackwell district, where a general and serious infestation was first noted in 1939 and where a "precautionary area" was established in 1941 [44]. Sanitary precautions at harvest halted appreciable spread, 48:xvi, and slowly increasing attention to crop rotation reduced chances of severe injury and the nematode population, 50:xiv. It occurs on a wide range of cult. crops, including *1a* [44] and *1d*, 52:xiv, and wild weedy plants in the infested area [44], 51:xv, 52:xiv; hatchings of eggs collected in Ont was stimulated by hatching factors in host leachates [1178].
- Meloidogyne* sp. (*M. ?hapla* Chitwood, *Heterodera marioni* (Cornu) Goodey); root-knot nematode, nodosité des racines: on *1b* Ont [44], Que 47:36; much more widespread than *H. schachtii* (q.v.), including the Blackwell district, Ont 42:33; on *1c* BC 42:28, 48:29.
- M. hapla* Chitwood: northern root-knot nematode, nodosité des racines: from *1b* Ont 53:xiv.
- Paratylenchus* sp.: associated with poor growth of *1a* Ont 57:53.
- Peronospora farinosa* (Fr.) Fr. (*P. effusa* (Grev.) Rabh., *P. schachtii* Fckl.): downy mildew, mildiou: a destructive seed crop disease first observed on *1a* in coastal BC 40:31, 43:43, [535], and later in the BC interior, 46:35. Observations indicated that the fungus is introduced into a new area as oospores on the seed and becomes epidemic on the seed crop from systemically infected plants; on *1d* Sask 26:23, [93, p. 30].
- Phoma betae* Frank: black leg, jambe noire: a common seed-borne parasite of *1a*, *1b*, *1c*, particularly in areas where seed crops are grown; on *1b* on leaves BC Man Ont 35:19, on leaves, inflorescence and seedballs Ont 42:31, as the predominant isolate of diseased seedlings, Alta 49:33 et seq., and on roots in storage Alta 53:48; similarly on *1c* BC Man 24:36, NS 38:23, PEI 41:22, [1138]; on *1a* BC Man 24:33, Man [93, p. 134], Alta Man PEI 31:34, Que 43:43, NB 30:39, [1138]; on *1d* BC 42:65; from seed of *1b* BC, *1c* NB, *1d* Netherlands [374]; the perfect state, *Pleospora betae* Björling, is unknown in Canada.
- Phyllosticta betae* Oud. (*Phoma betae*, q.v.): on leaves of *1b*, *1c* Man [93, p. 135].
- Pythium aphanodermatum* (Edson) Fitzp. and *P. ultimum* Trow: root rot, pourriture pythienne: cf. *Aphanomyces cochlioides*.
- P. debaryanum* Hesse: damping-off, fonte des semis: reported on *1a* BC 31:35, Que NS 35:25, NS [1138].
- Ramularia beticola* Fautr. & Lamb.: leaf spot, tache ramularienne: causes spots usually larger and paler than those of *Cercospora* (q.v.); first observed in a field of *Cercospora*-resistant *1b* BC 40:25; probably of some importance in seed fields during World War II, 42:33, 43:35; on *1a* BC 47:43; on *1c* BC 41:22; on *1d* BC 42:65.
- Rhizoctonia solani* Kühn: damping-off or seedling blight, fonte des semis ou brûlure des plantules: reported occasionally on *1b* Sask 53:55, Man 45:37, 57:45, Que 56:43, and in black root Alta 54:51, which, however, may be due to *A. cochlioides* (q.v.) Ont 48:31. On the other hand, *R. solani* is associated with root rot in half-grown roots in Ont, when the loss at harvest may be high, especially in heavy soils, 41:23 et seq., and in Alta 49:33; on seedlings of *1c* NB 35:18, and in storage rot BC 42:28, NB 29:30; on seedlings of *1a* Ont 53:55, NB NS 43:43, and in root rot NB 30:39, PEI 39:37, [1138]; from seed of *1a* Que [374].
- Rhizopus* sp.: associated with storage rot of *1c* BC 42:28.
- R. arrhizus* Fischer: root rot, pourriture des racines: on *1b* in a plot at Harrow, Ont 42:32, and in fields in Essex Co. Ont; caused little loss in field, but potentially dangerous to roots in piles awaiting processing, 44:34; disease easily reproduced in the field by inoculation of wounded plants. Comparative studies showed that *R. arrhizus* and *R. oryzae* Went & Prin.-Geerl. were high-temperature wound parasites, whereas *R. nigricans* Ehrenb. was a low-temperature organism [450].
- Septoria betae* West.: leaf spot, tache septorienne: on *1b* BC 40:26; on *1d* BC 40:53; from seed of *1* BC [374].
- Stemphylium botryosum* Wallr.: on leaves of *1a* BC [535]; from seed of *1* BC, *1c* NB, *1d* Pa [374].
- Streptomyces scabies* (Thaxt.) Waks. & Henrici (*Actinomyces* s. (Thaxt.) Güssow): scab, gale commune: on *1a* BC 49:40, Alta 31:34, Ont Que NB 24:34, Ont 59:45, NS 44:39, PEI 29:26, Nfld 50:51; fairly common in Que PEI Nfld; disease worse on land known to be infested Ont 27:56, Que 36:22; on *1b* BC 29:37, NB 40:25; on *1c* NB 40:24 [cf. 1138].
- Uromyces betae* Tul. ex Kickx: rust, rouille: a euautoe-cious rust, but only II and III known in Canada; first observed on *1a*, *1b*, *1c* in coastal BC 35:18, 19,

25; this outbreak was probably an extension of range from Calif, Oregon [15, p. 238] and Wash [982], although seed samples from Europe were carrying a heavy load of II and III spores. Rust infections heaviest in early spring and late fall at Saanichton; the low temperature requirements for spore germination and rust development probably explain its occurrence only in coastal BC 42:39; also on *Id* BC 41:53.

Virus: mosaic, mosaïque: suspected but not experimentally demonstrated on *la* NB 44:39, 45:48; on *lb* Que 42:33; on *lc* BC 34:23, Que 42:28, NB 46:17, PEI 41:22; similarly curly top on *lb* BC 41:24, Ont 35:20, *lc* BC 41:22, NB 39:31 et seq.; and fern leaf on *lc* NB 39:31.

Virus, savoy: circumstantial evidence is advanced for the occurrence on *lb* in s.w. Ont 41:24, [448]; caused by a virus that is transmitted by the pigweed bug, *Piesma cinerea* Say.

Boron deficiency, carence de bore: recorded as crown and dry rot, internal black speck, etc.: although the cause was unrecognized for a period, the symptoms were well described in 1925 on *lc* BC 25:46; also on *lc* Ont 42:28, NB 37:18, PEI 39:31, BC 49:31; on *la* BC 36:22, Ont 45:56, Que PEI 41:30, Que NB 42:40, NS 57:53, Nfld 54:59; on *lb* Ont 43:34, Que 42:33.

Phosphorus deficiency or low phosphorus-nitrogen ratio: recorded on *lb* Ont 59:36.

Betula L.

CORYLACEAE

Deciduous trees or shrubs in the northern hemisphere; some are valuable timber trees and several are cult. for ornament.

1. *B. alba* L. (*B. pubescens* Ehrh., *B. odorata* Bechst.), European white birch, bouleau blanc; introduced from Europe and known in Nfld and NS; reported also in s.w. Greenl.
2. *B. lenta* L., sweet birch, merisier rouge; known with certainty from e. Ont and s.w. Que; because of its limited range of little economic importance in Canada.
3. *B. lutea* Michx.f. (*B. alleghaniensis* Britt.), yellow birch, merisier; most important hardwood tree in Eastern Canada, ranging from Nfld and NS to Ont; wood used extensively for flooring, furniture, etc.
4. *B. occidentalis* Hook. (*B. fontinalis* Sarg.), water birch, merisier rouge; in Canada from n. Ont and Man to interior BC and the Yukon; wood sometimes used for firewood and fence posts. Because *B. occidentalis* has been confused with varieties of 5, records on this host are uncertain.
5. *B. papyrifera* Marsh. (*B. alba* L. var. *p.* (Marsh.) Spach), white birch, bouleau à papier; in every part of Canada and into Alaska; wood sawn for lumber and large quantities used as firewood, but has limited use in industry; several varieties are recognized.

6. *B. populifolia* Marsh., wire birch, bouleau rouge; from PEI and NS to Que and Ont, rarely reaches commercial size in Canada; used only locally for fuel and barrel hoops.
7. *B. glandulosa* Michx., dwarf birch, bouleau de savane; arctic N. America south to Que and n. Ont, Alta BC and in Alaska.
8. *B. nana* L.; practically circumpolar, including Greenl and Alaska.
9. *B. pumila* L., low birch, bouleau de savane; in Canada from Nfld, Labr, NS and Que to BC.

Other hosts: 10, *B. alba* L. var. *purpurea*. 11, *B. glandulifera* (Regel) Butler. 12, *B. intermedia* Thomas. 13, *B. kenaica* Evans. 14, *B. pendula* Roth (*B. verrucosa* Ehrb.). 15, *B. resinifera* Britt. (*B. neolaskana* Sarg.).

Absidia glauca Hagem.: associated with rootlets of 3 NS F51:121.

Agyrium rufum (Pers.) Fr.: on old wood of 14 Yukon [600].

Antennatula arctica Rostr. [*Antennularia* sp.]: on 1, 7 Greenl [900].

Apiospora rosenvingei Rostr.: on 7 Greenl [900].

Aporpium caryae (Schw.) Teixeira & Rogers: on 3 NS [670].

Arachnopeziza aurelia (Pers.) Fckl.: on old wood of 5 Man [93, p. 38].

Armillaria mellea (Vahl ex Fr.) Kummer: root rot, pourridié-agaric: most common cause of butt rot of 3 NB NS F52:20; cause of shoestring root rot of 3, 5 Ont F54:75, BC [1198]; on *B. sp.* NB 30:78; common at bases of decaying stumps of various trees [1138].

Asterodon ferruginosus Pat.: on *B. sp.* BC [1207].

Atopospora betulina (Fr.) Petr. (*Dothidella b.* (Fr.) Sacc., *Euryachora b.* (Fr.) Shroet., *Rehmiiodthis b.* (Fr.) Arx): tar spot, tache goudronneuse: on 7 Alaska [175], Yukon [600], Que [53]; on 7, 8, 12 Greenl [899]; on 5 as *Rehmiellopsis betulina*, Alta F63:105.

Calocera cornea (Batsch ex Fr.) Loudon: common on *B. sp.* Man [93, p. 74], NS [1138].

Cenangella hartzii Rostr.: on 1 Greenl [900, p. 611].

Ceratostomella cirrhosa (Pers. ex Fr.) Sacc.: on 1 Greenl [900].

Chlorosplenium aeruginascens (Nyl.) Karst.: on 5 Que 33:107.

Ciboria sp.: on fallen male catkins of 5 Man [93, p. 39].

Cladosporium ?caducum Davis: on 5 Man [93, p. 115].

C. herbarum Lk.: on 8 Greenl [901].

Coniosporium miserrimum Karst.: on 1 Greenl [901].

Coniothecium betulinum Cda. [*Melanconium atrum* Lk.]: on twigs of *B. spp.* Man Ont [93, p. 116]; on 7 Greenl [900, 901]; on 8 Greenl [900].

Conoplea sphaerica (Pers.) Pers.: on *B. sp.* Que [484].

Cordana pauciseptata Preuss: on periderm of *B. sp.* Que, from wood of 3 NB NS [480].

Corticium albo-ochraceum Bres.: on bark of *B. sp.* NS [93, p. 59].

C. contiguum Karst.: on 5 BC [1198].

Betula

- Corticium galactinum* (Fr.) Burt: white stringy rot, carie blanche filandreuse: from decay of 3 Ont F54:75, NS F52:20; on *B. sp.* Ont [1160]; see *Abies*.
- C. incrustans* Höhn. & Litsch.: on 5 BC [1207].
- C. lacteum* Fr., nom. dub.: on 8 Greenl [901, 902].
- C. laeve* Pers. ex Fr. (*C. evolvens* Fr.): on *B. sp.* Alaska [175]; see *Abies*.
- C. lividum* (Pers. ex Fr.): on *B. spp.* NS [1138]; see *Abies*.
- C. pelliculare* Karst.: on 5 Man [93, p. 76]; see *Abies*.
- Coryneum kunzei* Cda.: on 8 Greenl [900].
- Cryptospora betulae* Tul.: on *B. spp.* NS [1138].
- Cryptosporium neesii* Cda.: on 1 Greenl [900].
- C. neesii* var. *betulinum* Sacc.: on 5 Ont F58:59; the conidial state of *Cryptospora betulae* (q.v.).
- Cucurbitaria karstenii* Sacc.: on 1 Greenl [900].
- Cylindrosporium betulae* Davis: leaf spot, tache des feuilles: on 5 BC [535], Que F61:53, NB F58:28.
- Cyphella lateritia* Rostr.: on 1 Greenl [900, p. 600].
- Cytospora ambiens* Sacc.: associated with dieback of *B. sp.* Sask F52:96.
- C. chrysosperma* (Pers.) Fr.: associated with canker of 5 Sask F54:98.
- C. leucosperma* Pers. ex Fr.: on 1 Greenl [900].
- C. pulcherrima* Dearn. & Hansbr.: on *B. sp.* BC [253].
- C. salicella* Sacc. and *C. salicis* (Cda.) Rabh.: on 8 Greenl [901].
- Daedalea confragosa* Bolt. ex Fr.: white spongy rot, carie blanche spongieuse: from decay of 3 NB F52:20; on *B. spp.* NS, very common on hardwood stumps and logs [1138]; from *B. sp.* Ont, 5 Que [791]; on 5 BC [1198]; studied in culture by Nobles [791].
- Daldinia concentrica* (Bolt. ex Fr.) Ces. & de Not.: on *B. sp.* Ont 33:108; on *B. spp.* NS [1138]; on 4 BC [50].
- D. occidentalis* Child: on *B. sp.* BC [50], Sask [93, p. 59]; on *B. sp.*, 4 Alaska [175]; on 4 BC 33:108; common on fire-killed 5 Alaska [555].
- Dasyscyphus bicolor* Bull. ex Fckl.: on 1, 7 Greenl [900].
- Dendrodochium betulinum* Rostr.: on 1 Greenl [900, p. 630].
- Dermea molliuscula* (Schw.) Cash (stat. conid. *Gelatinosporium fulvum* Pk., q.v.): on *B. spp.*, commonly 3 Ont Que NS [370]; on *B. spp.* NS [1138]; on 3 Ont [175, p. 304]; on 5 Ont F59:66.
- Diaporthe aristata* (Fr.) Karst.: on 1 Greenl [900].
- Diatrype stigma* Hoff. ex Fr.: on *B. sp.* NS [1138]; on 4 BC [50]; on 5 Man, common [93, p. 59]; on 15 Alaska [175].
- Diatrypella betulina* Pk.: on *B. spp.* BC [50]; on 5 BC [1198]; on twigs and branches of *B. spp.* NS [1138].
- D. decorata* Nits.: canker, chancre diatrypelléen: common on 5 Man [93, p. 59]; on 5 Sask F54:98.
- D. discoidea* Cke. & Pk.: on *B. spp.* NS [1138]; on 5 Que 34:97; on 15 Alaska [175].
- D. favacea* (Fr.) Nits.: on *B. spp.* NS [1138]; on 1 Greenl [900].
- Didymosphaeria nana* Rostr.: on 8 Greenl [899, p. 557].
- Didymosporium minutissimum* Schw.: on 1 Greenl [900].
- Diplodia betulae* West.: on 8 Greenl [901].
- Discosia artocreas* (Tode) Fr.: on 1 Greenl [900].
- Ditiola radicata* Fr.: reported on *B. spp.* NS but probably is *Femsjonia luteo-alba* (q.v.) [1138].
- Durandiella seriata* (Fr.) Groves: on *B. sp.* Chelsea, Que [373, p. 140].
- Encoelia furfuracea* (Roth) Karst.: on *B. sp.* BC [1198].
- Eutypella angulosa* (Nits.) Sacc.: on *B. sp.* Alta F62:101; on 3 Ont F58:59; on 5 BC [1199].
- E. stellulata* (Fr.) Sacc.: twig blight, brûlure des rameaux: on 4 BC [50]; recorded on 5 BC [982].
- Exidia glandulosa* Bull. ex Fr.: on *B. sp.* Que 34:98.
- E. saccharina* Fr.: on 1 Greenl [900].
- Favolus alveolaris* (DC. ex Fr.) Qué. (*F. canadensis* Klotsch): from decay of 3 NB and/or NS F51:120; on 5 Sask [93, p. 81].
- Femsjonia luteo-alba* Fr.: on *B. sp.* Que [811]; on *B. spp.*, 3 NS [1138].
- Fenestella princeps* Tul.: on 1 Greenl [900].
- Flammula alnicola* (Fr.) Kummer (*F. connisans* sensu Ricken): yellow checked rot, carie jaune craquelée: from decay of 3 NB NS F52:20.
- F. lenta* (Fr.) Gill.: on buried sticks of *B. spp.* NS [1138].
- Fomes connatus* (Weinm.) Gill.: white spongy rot, carie blanche spongieuse: on *B. spp.* NB NS PEI [1138].
- F. everhartii* (Ell. & Gall.) Schrenk. & Spauld.: white spongy rot, carie blanche spongieuse: on 5 PEI [1138].
- F. fomentarius* (L. ex Fr.) Kickx: white mottled rot, carie blanche madrée: causes a rot of broad-leaved trees: on *B. sp.*, 4, 15 Alaska [175]; on *B. spp.* NB NS PEI, common [1138], PEI 26:30; from decay of 3 Ont F54:75, of 3, 5 Que 23:109, NB 50:114; from 3 NB NS, very common F51:120; on 5 Alaska [555], Sask Man, common [93, p. 81]; from 5 Sask Man 48:96; on 5 Yukon [1207]; recorded on 5 BC [982, 1198]; studied in culture by Nobles [791].
- Fomes igniarius* (L. ex Fr.) Kickx (*F. i.* var. *nigricans* auct. Am.): white trunk rot, carie blanche du tronc: common cause of rot and conks, which are abundant on 3 and 5; on *B. spp.* NS PEI, 3 NB [1138]; on *B. sp.*, 13, 15 Alaska [175]; from 3, 5 Ont 51:134 [791], Que 23:109, NS F51:120; from 3 NS, 5 Sask Man 48:96; on 4, 5 BC F54:129; on 5 Alaska [555], BC Alta F54:109, Yukon F61:124, [1207]; on 5 NB-Nfld, 6 NB NS F54:24; on 5 Sask Man, 14 Sask [93, p. 81].
- F. pinicola* (Sw. ex Fr.) Cke.: on *B. sp.* Sask [93], NS [1138]; on 5 BC [1198]; from 3, 5 Ont F55:62; from 5 Ont [740].
- F. robustus* Karst.: white spongy rot, carie blanche spongieuse: recorded on 5 BC [982].
- Fusarium acuminatum* Ell. & Ev.: frequent isolate from twigs of 3 Ont F51:134, [335]; *F. semitectum* Berk. & Rav.: from stained wood of 5 Ont [335].
- Fusicladium betulae* Aderh.: on 14 BC [535].
- Ganoderma applanatum* (Pers. ex Wallr.) Pat. (*Fomes applanatus* (Pers. ex Wallr.) Gill.: white mottled rot, carie blanche madrée: on *B. sp.* NS, 6 PEI [1138]; from 3 NS, 5 NB 50:114; from 3, 5 Ont F51:134; on 5 BC [1199], [cf. 93, p. 81].
- G. lucidum* (Leyss. ex Fr.) Karst.: on 3 NB F53:24.
- Gelatinosporium fulvum* Pk.: frequently isolated from twigs of 3 Ont F51:134; on *B. spp.* NS, associated with the perfect state, *Dermea molliuscula* (q.v.) [1138].
- G. magnum* Ell.: from twigs of 3 Ont 51:134; specimens under this name in DAOM are the conidial state of *Cryptospora betulae* (q.v.), fide Ruth H. Arnold.
- Gloeosporium betulae-luteae* Sacc. & Dearn. [*Cylindrosporella microsperma* (Pk.) Petr.]: leaf spot, tache des feuilles: on 3 Ont [Ann. Mycol. 13:125, 1915], NB F56:26.
- G. betulae-papyriferae* Dearn. & Overh. [*Cylindrosporella b.-p.* (Dearn. & Overh.) Arx, 15a, p. 63]: on leaves of 5 Man [93, p. 130], ? on 5 Ont 44:98.

- Gloeosporium betularum* Ell. & Martin [*Cryptocline b.* (Ell. & Martin) Arx, 15a, p. 26]: on *B. sp.* (sub *G. betulosum*) NB [1138]; on 7 Greenl [1900].
- G. betulicola* Sacc. & Dearn. [*Discula betulina* (West.) Arx, 15a, p. 35]: anthracnose: on 5 NB F58:28; on 6 Ont [Ann. Mycol. 13:125. 1915].
- Glonium betulinum* Rostr.: on 1 Greenl [900, p. 613].
- Gnomonia campylostyla* Auersw.: on *B. sp.* Que [53]; on 1, 7 Greenl [900]; on 7 BC [1207]; on 8 Greenl [899, 901].
- G. intermedia* Rehm: on 7 Que [53].
- Grandinia granulosa* Fr.: on 1 Greenl [900].
- Graphis scripta* (L.) Ach. var. *topographica* (Willd.) Zahlbr.: on bark of *B. spp.* NS [1138].
- Gyromitra infula* (Schaeff.) Quél.: on rotten wood of *B. spp.* NS [1138].
- Helicogloea lagerheimii* Pat.: on *B. sp.* BC [1207].
- Helminthosporium arbusculoides* Pk. (*Pleurophragmidium* state of *Melanomma subdispersum* (q.v.), fide Hughes [482]): on 1 Greenl [900].
- Helotium citrinum* (Hedw.) Fr.: common on old *B. sp.* Man [93, p. 40].
- Hendersonia betulina* Rostr.: on 1 Greenl [900, p. 625].
- Hericium coralloides* (Scop. ex Fr.) Pers.: on *B. spp.* NS [1138]; on *B. subcordata* BC 34:98.
- H. erinaceus* (Bull. ex Fr.) Pers.: white spongy rot, carie blanche spongieuse: from decay of 3 NB NS F52:20.
- H. ramosum* (Bull. ex Mérat) Letellier (*H. laciniatum* Leers ex Banker): white spongy rot, carie blanche spongieuse: on 3 NS F53:24; on 5 Alaska [555], Alta F54:112.
- Hymenochaete badioferruginea* (Mont.) Lév.: on *B. spp.* NS [1138].
- H. corrugata* (Fr.) Lév.: on branches of *B. spp.* NS [1138].
- H. tabacina* (Sow. ex Fr.) Lév.: on *B. spp.* NB NS, common [1138].
- Hypoxylon deustum* (Hoffm. ex Fr.) Grev. (*Ustulina vulgaris* Tul.): brittle white rot, carie blanche friable: associated with decay of 3 NB 50:114.
- H. fuscum* Pers. ex Fr.: on *B. sp.* BC [50].
- H. mammatum* (Wahl.) Miller (*H. pruinatum* (Klotsch) Cke.): on 3, 5 Ont, rare, F56:58.
- H. multiforme* Fr.: on *B. sp.* BC [50, 1198], Que 34:48; on *B. sp.* NS PEI, common, 3 PEI [1138]; on 5 Man [93, p. 59]; on 13 Alaska [175].
- Hysterium pulicare* (Pers.) Fr.: on *B. sp.* NS [1138]; common on old bark of 5 Man [93, p. 43].
- Hysteropatella minor* (Cke.) Rehm: on decorticated *B. sp.* NS [1138].
- Lachnea setosa* (Nees) Gill.: on *B. sp.* NS [1138].
- Lachnum bicolor* (Bull.) Karst.: on bark of 5 Man [93, p. 40].
- Lasiosphaeria ovina* (Pers.) Ces. & de Not.: on old wood of 5 Man [93, p. 51].
- Leciographa ?franconia* Rehm: on old wood of 5 Man [93, p. 40].
- Lentinus cochleatus* Fr.: on old 5 Man [93, p. 90].
- Lenzites betulina* (L. ex Fr.) Fr.: causes a white rot of broad-leaved or, rarely, coniferous trees: on *B. sp.* Que [791]; on *B. sp.*, 4, 5, 15 Alaska [175]; on *B. spp.* NS, 3 PEI [1138]; occasionally on 5 Alaska [555]; on 5 BC [1198]; Man [93, p. 81]; studied in culture by Nobles [791, cf. 810].
- L. saepiaria* (Wulf. ex Fr.) Fr.: on 5 BC [1198].
- Libertella sp.*: associated with stain of 5 Ont F53:84.
- L. betulina* Desm.: from 3 Ont F51:134; on 5 Man [93, p. 130].
- L. favacea* Trav.: from 3 Ont F51:134.
- Lophidium compressum* (Pers.) Sacc. var. *microscopicum* Karst.: on decorticated *B. sp.* NS [1138].
- Marssonina betulae* (Lib.) Magn.: leaf spot, tache des feuilles: on leaves of 5 NB 54:122, 55:115.
- Massaria pruni* Wehm.: on twigs of ?*B. sp.* NS [1138].
- ?*Melampsora sp.*: 0 on 5 Man 44:98.
- Melampsoridium betulinum* (Fr.) Kleb.: leaf rust, rouille des feuilles: II III on *B. sp.* 4, 7, 11, 13, 15 Alaska [175]; on *B. sp.* Alta F51:143, Man [93, p. 63]; on 3, 6 NS [1138]; on 5 BC, locally abundant F55:91, Yukon F61:124, [1207], Alta F63:104; on 5, 7 BC [1198]; on 6 Que F58:36; on 6 NS, 8 Nfld, 13 Alaska [15, p. 22]; on 7 Yukon F61:124, [1207], Ont [828]; on 14 BC Yukon F62:122, Alta 40:86.
- Melanconis decorahensis* Ell.: on branches of 5 Man; associated with *Melanconium parvulum* (q.v.) [93, p. 58]; on 5 Ont F63:70.
- M. nigrospora* (Pk.) Wehm.: on *B. sp.* NS [1138]; on 1 NS [1137]; on 3 Ont F51:121.
- M. stilbostoma* (Fr.) Tul.: twig blight, brûlure des rameaux: on *B. spp.* NS; often accompanied by the conidial state, *Melanconium betulinum* (q.v.) [1138]; from 5 NB [479, p. 621]; on 5 Ont F60:66.
- Melanconium sp.*: on *B. sp.* Ont 48:97.
- M. betulinum* Schm. & Kze.: on 1 Greenl [900]; on 1, 3 NS [1138]; on 15 Alaska [175].
- M. bicolor* Nees: on 4 Sask 38:92.
- M. parvulum* Dearn. & Barth.: twig blight, brûlure des rameaux: on branches of 5 Man [93, p. 131]; on 10 Que 33:61.
- Melanomma pulvis-pyrius* (Pers.) Fckl.: on 1 Greenl [900].
- M. subdispersum* (Karst.) Berl. & Vogl.: on *B. sp.* Ont [479, p. 609].
- M. subsparsum* Fckl.: on *B. sp.* NS [1138].
- Merulius corium* (Pers. ex Fr.) Fr.: on 15 Alaska [175].
- M. tremellosus* Schrad. ex Fr.: common on dead 5 Man [93, p. 82].
- Microsphaera penicillata* (Fr.) Lév. (*M. alni* (Wallr.) Salm.): powdery mildew, blanc: on *B. sp.* Man 31:119, [93, p. 44].
- Mollisia benesuada* (Tul.) Phill.: on *B. sp.* NS [1138].
- M. cinerea* (Batsch) Karst.: on 7 Greenl [901].
- M. fusca* (Pers.) Karst.: on 12 Greenl [899].
- M. ramealis* Karst.: on 8 Greenl [901].
- Monilia sitophila* Mont.: on veneer of *B. sp.* NS [1138].
- Mortierella alpina* Pyronel: from 3 NS F51:121.
- Mucor ramannianus* A.Moell.: from 3 NS F51:121.
- Mycena leaiana* (Berk.) Sacc.: on 3 Ont F62:70.
- Mycocalicium pallescens* (Nyl.) Vain: on decorticated *B. sp.* NS [1138].
- Mycosphaerella maculiformis* (Pers. ex Fr.) Schroet.: on 5 Que [53]; on 7 Que [52].
- Naematelia nucleata* (Schw.) Fr.: on dead branches of 5 Man [93, p. 74].
- Naematoloma fasciculare* (Huds. ex Fr.) Karst.: white spongy rot, carie blanche spongieuse: on 5 BC F56:91, [1198].
- Naemospora microspora* Desm.: on 8 Greenl [901].
- Naucoria firma* Pk. [*Agroclype f.* (Pk.) Sing.]: on buried sticks of *B. sp.* NS [1138].
- Nectria sp.*: cause of canker on 5 Que F53:48.
- N. sp.* (A): on *B. sp.* NS [1138].
- N. cinnabarina* Tode ex Fr.: on 1 Greenl [900].

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- Nectria coccinea* (Pers.) Fr. var. *faginata* Lohm., Wats. & Ayers: on *B. spp.* NS [1138].
- N. episphaeria* Tode ex Fr.: on 3 Ont 34:97.
- N. galligena* Bres.: canker, chancre necrien: on 5 Que 46:76. The cause of canker in 3 in Que and of other deciduous trees of n.e. N Am; ascospore discharge and conidium release by this species under field and laboratory conditions are described [612].
- N. pithoides* Ell. & Ev.: on *B. sp.* NS [1138].
- N. sanguinea* (Bolt. ex Fr.) Fr.: on *B. sp.* BC [50].
- Odontia bicolor* (Alb. & Schw. ex Fr.) Quél.: white stringy rot, carie blanche filandreuse: from decay of 3 NB, 5 Ont [792].
- O. lactea* Karst.: on *B. sp.* NS [1138].
- O. spathulata* (Fr.) Litsch.: on 5 BC [1198].
- Panus rudis* Fr.: on dead 5 Alaska [555], Man [93, p. 93], BC [1198].
- P. stipticus* (Bull. ex Fr.) Fr.: on *B. sp.* NS [1138]; on 5 BC [1207].
- P. stipticus* f. *luminescens* Buller: on old 5 Sask Man; the N. American form of the species is luminous [93, p. 93].
- P. violaceofulvus* (Batsch) Quél.: on *B. sp.* Ont [93].
- Paxina hispida* (Schaeff.) Seav.: on rotted wood of *B. sp.*, etc. Man [93, p. 37].
- Peniophora aspera* (Pers.) Sacc. (*P. setigera* (Fr.) Höhn. & Litsch.): on *B. spp.* NS [1138]; on 3 NB NS F53:25; on 5 BC [1198]; see *Abies*.
- P. aurantiaca* (Bres.) Höhn. & Litsch.: on *B. sp.* Alaska [175], Man [93, p. 77].
- P. carnosa* Burt: on *B. spp.* NS [1138].
- P. cinerea* (Fr.) Cke.: on dead branches of 5 Man [93]; "cinerea" group on *B. spp.* NB NS [1138].
- P. cremea* (Bres.) Sacc. & Syd.: on *B. sp.* NS [1138].
- P. incarnata* (Pers. ex Fr.) Karst. (*Corticium incarnatum* Pers. ex Fr.) on 1 Greenl [900].
- Pezicula alnicola* Groves: on 3 Ont [366, p. 121].
- Phialophora* sp.: on 3 NB [479, p. 624].
- Phlebia radiata* Fr. (*P. merismoides* Fr.): associated with decay of 3 NB and/or NS F51:120; on 5 BC [1198].
- P. strigosozonata* (Schw.) Lloyd: on 5 Man [93, p. 80].
- Pholiota adiposa* (Fr.) Kummer: brown mottled rot, carie brune madrée: on dead wood of *B. spp.* NS [1138]; associated with decay of 3 NB NS F51:120; on 5 Ont F54:72; the fungus is *P. aurivella* (Batsch ex Fr.) Kummer [375].
- P. albocrenulata* Pk.: on fallen trunk of *B. sp.* NS [1138].
- P. lutea* Pk.: on *B. sp.* NB [1138].
- P. mutabilis* (Schaeff. ex Fr.) Quél.: brown mottled rot, carie brune madrée: on log of *B. sp.* [1138]; see *Populus*.
- P. spectabilis* (Weinm. ex Fr.) Quél.: brown mottled rot, carie brune madrée: from decay of 3 NB and/or NS F52:20.
- P. squarrosoides* (Pk.) Sacc.: brown mottled rot, carie brune madrée: on stumps and logs of *B. spp.* NS [1138]; on 4 Alaska [175]; on 5 Alaska [555], BC [1198].
- P. subsquarrosa* (Pers. ex Fr.) Kummer: on 5 BC [1198].
- Phyllactinia guttata* (Fr.) Lév. (*P. corylea* (Pers.) Karst.): powdery mildew, blanc: on 1, 3, 6 NS 52:102; on 5 Sask Man [93, p. 44], Ont 44:99.
- Phyllosticta betulae* Ell. & Ev.: leaf spot, tache des feuilles: on *B. sp.* NB 28:88, [1138]; on 5 Ont 44:99; on 5 cult. Man [93, p. 135].
- Phyllotopsis nidulans* (Pers. ex Fr.) Singer (*Claudopus n.* (Pers. ex Fr.) Karst.): on logs of *B. sp.* NS [1138]; on 5 BC [1198].
- Pleomassaria siparia* (Berk. & Br.) Sacc. (stat. conid. *Prosthemium betulinum* Kze.): on 5 Ont F59:66.
- Pleurotus ostreatus* (Jacq. ex Fr.) Kummer: white spongy rot, carie blanche spongieuse: on 5 Alaska [555].
- P. petaloides* (Fr.) Quél.: on old 5 Man [93, p. 94].
- P. sapidus* Kalchbr.: on *B. sp.* NS [1138], BC [1198].
- P. serotinus* (Schrad. ex Fr.) Kummer: white spongy rot, carie blanche spongieuse: on logs of *B. spp.* NS [1138]; from 3 NS F52:120; on 5 BC [1198], Ont [93].
- Pluteus cervinus* (Schaeff. ex Secr.) Kummer: on 5 BC [1198].
- Polyporus adustus* Willd. ex Fr.: white mottled rot, carie blanche madrée: on *B. sp.* NS [1138]; from 5 Man 48:96, BC [1198]; associated with decay of 3 NB and/or NS F51:120.
- P. albellus* Pk.: white spongy rot, carie blanche spongieuse: on *B. sp.* Ont, 3 Ont Que [791]; on *B. spp.* NS [1138]; from decay of 3 NB F52:20; on 4 BC [982]; on 4, 15 Alaska [175]; on dead 5, not uncommon, Man [93, p. 82]; on 5 BC [1198], Alaska [555]; see also [795].
- P. arcularis* Batsch ex Fr.: on *B. sp.* BC [1198]; on dead 5 Man [93].
- P. betulinus* Bull. ex Fr.: causes a brown cubical rot of sapwood of *B. spp.*; from *B. sp.* BC Ont Que, 3, 5 Ont [791]; common on *B. spp.* NB NS PEI [1138]; on *B. sp.*, 4, 15 Alaska [175]; on 4 BC [982, 1198]; on dead 5 Alaska [555]; on 5 BC [1198], Alta F53:131, Sask Man, common [93]; studied in culture by Nobles [791].
- P. brumalis* Pers. ex Fr.: causes a white rot of broad-leaved trees: on *B. spp.* NB NS; the common stipitate black-brown, small-pored species on decaying wood [1138]; from 3 Que [791]; on fallen branches of 5 Man [93].
- P. caesius* Schrad. ex Fr.: on dead wood of *B. sp.* PEI [1138].
- P. contiguus* Pers. ex Fr.: on 1 Greenl [900].
- P. cuticularis* Bull. ex Fr.: white spongy rot, carie blanche spongieuse: from 5 Sask Man 48:96.
- P. dichrous* Fr.: on stump of 5 Alaska, rare [555], BC [1198].
- P. elegans* Bull. ex Fr.: on decaying *B. spp.* and other hosts NB NS PEI [1138]; on 1 Greenl [900].
- P. epileucus* Fr.: on *B. spp.* NS, doubtful [1138].
- P. fumosus* Pers. ex Fr.: on 5 BC [1198].
- P. galactinus* Berk.: white spongy rot, carie blanche spongieuse: on 3 NS [1138].
- P. hirsutus* Wulf. ex Fr.: white spongy rot, carie blanche spongieuse: on *B. spp.* NS, 3 NB common [1138]; on 4 Alaska [175]; on 5 Alaska [555], BC [1198].
- P. nidulans* Fr. (*P. rutilans* Pers. ex Fr.): on *B. sp.* NS [1138]; from *B. sp.* Ont [791]; on dead 5 Man [93, p. 83], Ont. F63:70.
- P. nigricans* Fr.: on 1 Greenl [899].
- P. osseus* Kalchbr.: recorded on 4 BC [982].
- P. pargamenus* Fr.: white spongy rot, carie blanche spongieuse: from *B. sp.* Que [795]; on *B. spp.* NB NS [1138]; on *B. sp.*, 5, 15 Alaska [175]; on 3, 5 Ont F55:62; on 5 BC [1198], Yukon [1207]; common on 5 Sask Man [93]; on 15 Alta [791]; for culture studies see [791, 795].
- P. picipes* Fr.: recorded on 5 BC [1198].

- Polyporus pubescens* Schum. ex Fr.: white spongy rot, carie blanche spongieuse: on 5 BC [1198]; from decay of 3 NB and/or NS F52:20; of Sask 48:96; also recorded on 4 BC [982].
- P. radiatus* Sow. ex Fr.: causes a white rot: on *B. sp.* Ont [791]; on *B. spp.* NB NS [1138]; on 13 Alaska [175].
- P. resinosus* Schrad. ex. Fr.: on *B. sp.* Ont [795]; on 5 Alaska [555]; on 15 Alaska [175].
- P. semisupinus* Berk. & Curt.: on *B. sp.* NS, not common [1138].
- P. stereoides* Fr.: on 15 Alaska [175]; see *Alnus*.
- P. tephroleucus* Fr.: on 3 NS [1138]; on 5 BC [1198].
- P. tomentosus* Fr.: on *B. sp.* BC [1199].
- P. tulipiferae* (Schw.) Overh. (*Irpex t.* Schw.): on *B. spp.* NS [1138]; on 5 Sask 36:67, BC [1198].
- P. velutinus* Fr.: on 5 BC [1198], Sask 36:67, on 6 NS [1138].
- P. versicolor* L. ex Fr.: white spongy rot, carie blanche spongieuse: on *B. spp.* NS [1138]; on 4 Alaska [175]; on 5 Alaska [555], Yukon [1207].
- P. vulpinus* Fr.: on 1 Greenl [900].
- Poria alutacea* Lowe: on 5 BC [1207].
- P. cocos* (Schw.) Wolf: white spongy rot, carie blanche spongieuse: from decay of 3 NB and/or NS F52:20.
- P. eupora* (Karst.) Cke.: on *B. spp.* NS [1138].
- P. ferruginosa* (Schrad. ex Fr.) Karst.: on 5 BC [1198]; on 15 Alaska [175].
- P. laevigata* (Fr.) Karst. (*Fomes igniarius* (L. ex Fr.) Kickx var. *l.* (Fr.) Overh.): white spongy rot, carie blanche spongieuse: on down *B. spp.* NS [1138]; from *B. spp.* BC Ont, 5 Ont [791]; on 5 BC [1198].
- P. obliqua* (Pers. ex Fr.) Karst.: white spongy rot, carie blanche spongieuse: on broad-leaved trees, usually *B. spp.*; on *B. sp.* NS, 3 NB [1138]; on 3, 5 Que F53:48; on 5 Alta Man F51:144, Que F53:48; associated with heart rot of 5 BC 49:94, [1198]; studied in culture by Nobles [791].
- P. prunicola* (Murr.) Sacc. & Trott.: on 3 NS [1138].
- P. subacida* (Pk.) Sacc.: white stringy rot, carie blanche filandreuse: on *B. sp.* BC [1198]; from 3 NB and/or NS F52:20; recorded on 5 BC [982].
- P. tarda* (Berk.) Cke. (*P. semitincta* (Pk.) Cke.): on *B. spp.* NS [1138].
- Porothelium fimbriatum* Pers. ex Fr.: on *B. spp.* NS [1138]; on decaying wood of 5 Man [93, p. 85].
- Propolis faginea* (Schrad.) Karst.: on 1 Greenl [900].
- Pseudovalsa lanciformis* (Fr.) Ces. & de Not.: on 1 Greenl [900].
- Psilopezia aquatica* (DC.) Rehm: on rotten *B. sp.* NS [1138].
- Pycnoporus cinnabarinus* (Jacq. ex Fr.) Karst. (*Polyporus c.* Jacq. ex Fr.): causes a white rot of broad-leaved trees or rarely of conifers: on *B. sp.* Nfld, 3 NS PEI, 5 PEI F53:25; on *B. spp.* BC Ont, 3 Ont, 5 BC [794]; from 3 Ont [791]; on 5 BC [1198]; for its morphology and physiology in culture, see [671, 794].
- Radulum orbiculare* Fr.: on 1 NS [1138].
- Rosellinia pulveracea* (Ehrh.) Fckl.: on 1 Greenl [900].
- Schizophyllum commune* Fr.: white sapwood rot of broad-leaved trees: on *B. sp.* BC [1207]; on *B. spp.* Sask Man [93, p. 95]; from *B. sp.* Ont, studied in culture by Nobles [791].
- Sclerotinia betulae* Wor.: on fallen seeds of 5 Man [93, p. 41].
- Septoria betulae* (Lib.) West.: leaf spot, tache des feuilles: on 1 cult. Man 45:102; on 3, 6 NS 52:103; on 3 NS [1138, p. 111]; on 5 NB NS Nfld, 6 NB F56:26; on 5 Que, 9 Man 43:95.
- S. phetulicola* Pk.: on 5 Ont [93, p. 137].
- S. betulina* Pass.: leaf spot, tache des feuilles: on 1, 6 NS 53:105.
- S. boycei* Dearn.: on seedlings of 1 Man [93, p. 137].
- S. microsperma* Pk.: on 5 Que 33:107.
- Solenia anomala* (Pers.) Fckl.: on old 5 Man, common [93, p. 78].
- S. fasciculata* Fr.: on old twigs, etc., of *B. spp.* NS [1138].
- Sphaerella harthensis* Auersw.: on 7 Alaska [175].
- Steccherinum ochraceum* (Fr.) S.F.Gray: on *B. spp.* NS [1138]; on 5 BC [1199].
- S. pulcherrimum* (Berk. & Curt.) Banker and *S. septentrionale* (Fr.) Banker: on old 5 Man [93, p. 81].
- Steganosporium fautreyi* Sacc. & Syd.: on branches of 5 Man [93, p. 131].
- S. muricatum* Bon.: on 5 Ont F59:66; probable only one species of *Steganosporium* is present on *Betula*; *S. muricatum* has priority.
- S. taphrinum* Sacc.: on 1 Greenl [900].
- Stemonitis herbatica* Pk.: on *B. sp.* BC [1207].
- Stereum bicolor* (Pers. ex Fr.) Fr. [*Laxitextum b.* (Pers. ex Fr.) Lentz]: on 5 BC [1198].
- S. crispum* Pers.: on 1 Greenl [900]; *S. crispum* Qué., not *Thelephora crispa* Pers., has been referred to *S. sanguinolentum*.
- S. gausapatum* Fr.: on *B. sp.* PEI [1138].
- S. hirsutum* (Willd. ex Fr.) S.F.Gray: white sap rot, carie blanche de l'aubier: on dead stump of *B. sp.* Greenl [899]; on 5 Alaska, common [555], Sask [93], NB F53:26, BC [1198].
- S. murrayi* (Berk. & Curt.) Burt: causes a white rot and canker of broad-leaved trees; on *B. spp.* NS [1138]; from 3 Ont F54:75, Que F53:48, NB and/or NS F52:20; from 5 Que [791].
- S. ochraceoflavum* (Schw.) Ell.: on 5 NS F53:26.
- S. ostrea* Blume & Nees ex Fr.: (*S. fasciatum* (Schw.) Fr.): white crumbly rot, carie blanche friable: on 3 NB F53:26; on 5 BC [1198]; on old 5 Man [93].
- S. purpureum* (Pers. ex Fr.) Fr. (*S. rugosiusculum* Berk. & Curt.): silver leaf, plomb: on *B. sp.* Sask F52:96; on 4 Alaska [175]; on 5 Alaska, common [555], Sask Man [93, p. 78], Ont 35:60, BC [1198]; on 6 NB F53:26, NS [1138]; on old wood Man Ont [93].
- Stictis radiata* L. ex Pers.: on *B. sp.* NS [1138].
- Taeniolella alta* (Ehrenb.) Hughes (*Torula alnea* Pk.): on ?*B. sp.* Man [93, p. 127].
- Tapesia fusca* (Pers. ex Fr.) Fckl.: on decayed *B. spp.* NS [1138].
- Taphrina alpina* Johans.: on 8 Greenl [901].
- T. americana* Mix: on 5 Alaska [736].
- T. bacteriosperma* Johans.: on 7 BC F63:125; on 8 Greenl [899].
- T. betulina* Rostr.: on 1 Greenl [900].
- T. boycei* Mix: leaf blister, cloque des feuilles: recorded on 4, 5 BC [982; cf. 735].
- T. carnea* Johans.: leaf blister, cloque des feuilles: on 3 Que 57:116, NB 56:118; on 3 Ont Que, 77 Que [735]; on 5 NB PEI F56:26; on 7 BC F62:122; on 7 Que [605], F58:37, Greenl [900]; on 7 Keew Man, 9 Nfld [736]; on 7 Keew, 9 Nfld 52:103; on 8 Greenl [899, 901].
- T. flava* Farl.: on 5 Que F58:37; on 5, 6 NS [1138; cf. 735].
- T. nana* Johans.: on 5 Alta F60:91; on 7 Que 52:103, [736].

Betula

- Tomentella* sp.: on 5 BC [1198].
T. coriaria (Pk.) Bourd. & Galz. (*Hypochnus coriarius* (Pk.) Burt): on decayed 5 Man [93, p. 77].
T. ferruginea Pers.: on 1 Greenl [900].
T. fusca (Fr.) Schroet.: on *B. spp.* NS [1138].
T. pallidofulva (Pk.) Litsch. (*Hypochnus pallidofulvus* (Pk.) Burt): on decayed 5 Man [93, p. 77].
Torula mollis (Sommerf.) Fr.: on 5 BC [1198].
Trechispora brinkmanni (Bres.) Rogers & Jacks.: white stringy rot, carie blanche filandreuse: on *B. sp.* NS [1138]; from 3 NB and/or NS F52:20; see *Abies*.
Tremella albida Huds.: on 1 Greenl [900].
T. lutescens Pers.: on *B. sp.* Man [93, p. 74].
Trichocladium canadense Hughes: from decay of 3 Ont NB, 5 Ont [483].
Trichosphaeria breviseta Dearn.: on bark of 5 BC [50].
Trogia crispa Fr.: causes a white rot: on *B. spp.* Man, common [93, p. 96], NB NS [1138]; on 4 Alaska [175]; on logs of 5 Alaska [555]; on 5 BC [1198].
Tulasnella eichleriana Bres.: on decayed wood of 5 Man [93, p. 74].
Tympanis alnea (Pers.) Fr.: on *B. sp.* Alta F62:102.
T. conspersa Fr.: on 1 Greenl [900].
Valsa betulina Nits.: on 1 Greenl [900].
V. ceratophora Tul.: on *B. sp.* BC [50].
Valsaria niesslii (Wint.) Sacc.: on 1 Greenl [900].
Vararia effusata (Cke. & Ell.) Rogers & Jackson: from decay of 3 NB and/or NS F52:20.
Venturia ditricha (Fr.) Karst.: on *B. spp.* Que [53]; on 7 Que [52, 53], Greenl [900]; on 9 Greenl [902].
Verpatinia duchesnayensis Whetz.: vein ink spot, tache d'encre des nervures: on fallen leaves of 3 Que [1156, p. 695].
Wallrothiella minima (Fckl.) Sacc.: on 1 Greenl [900].
 Dieback, dépérissement: cause unknown, cause inconnue: a progressive dieback of the crowns is the first aboveground evidence of a disease that has killed many trees of 3, 5 NB 43:95, and *B. spp.* Que NS PEI 47:100; excessive rootlet mortality in healthy appearing trees seems to be the first indication of the disease condition [360].

Bidens L.

COMPOSITAE

Annual or perennial herbs, weedy plants, mostly native to the New World, little known in cult.; commonly called beggarticks or sticktight, bident ou fourchette.

1. *B. cernua* L. (including *B. glaucescens* Greene); in Canada from PEI and NS to BC.
2. *B. frondosa* L.; in Canada from Nfld to Ont.
3. *B. vulgata* Greene; in Canada from s. Que to s. Alta.

- Cercospora umbrata* Ell. & Holw.: on 2 Man [93, p. 115].
Entyloma compositarum Farl.: on *B. sp.* NB [292, 1138]; on 1 BC [535; cf. 946, p. 113].
Plasmopara halstedii (Farl.) Berl. & de Toni: on 2 Man [93, p. 31].
Saccardia quercina Cke.: doubtfully on *B. sp.* NS [1138].
Septocylindrium concomitans (Ell. & Holw.) Halst.: on leaves of 1, 2, 3 Man [93, p. 127].
Sphaerotheca macularis (Wallr. ex Fr.) Magn. (*S. humuli*

(DC.) Burr.): powdery mildew, blanc: on 1 BC [535]; on 2 NS [1138].

- S. fuliginea* (Schlecht. ex Fr.) Poll. (*S. humuli* var. *f.* (Schlecht.) Salm.): on 1 BC 14:98, [50]; on 1, 2 NS [1138]; on 2 Que 31:119.

Boltonia L'Her.

COMPOSITAE

Tall perennial herbs, native to the US and e. Asia; one sometimes planted in borders and wild gardens.

1. *B. asteroides* (L.) L'Her.; native to e. US.

Virus: streak, bigarrure: cause of a severe streaking of the leaves of *B. sp.* in the flower border at the Experimental Farm, Fredericton, NB. Virus transmitted by grafting, but "attempts to transmit the virus by sap or insect were unsuccessful," 41:88; again severe, 45:109, 51:111; not recorded elsewhere.

Boschniakia C.A.Mey. OROBANCHACEAE

Fleshy herbaceous plants parasitic on the roots of trees and shrubs, native to Asia and w. N. America.

1. *B. rossica* (Cham. & Schlecht.) Fedtsch., occurring from west-central Asia to Alaska-Yukon; parasitic at least on *Alnus*.

Helotium cyathodeum (Bull. ex Fr.) Karst.: on *B. sp.* Alaska [176]; on 1 Alaska [1038].

Botrychium Sw.

OPHIOGLOSSACEAE

Small herbaceous ferns of nearly cosmopolitan distribution.

1. *B. dissectum* Spreng. and la, *B. d.* var. *obliquum* (Muhl.) Clute; known in NS and Que.
2. *B. multifidum* (Gmel.) Rupr., leathery grapefern, botryche multifide; in Canada from Nfld to n. Alta and BC. 2a, *B. m.* var. *intermedium* (D.C. Eaton) Fern.; in Canada in NS and from Que to BC.

Mycosphaerella botrychii (Rostr.) Savile: on 1a Que, 2 Ont Que, 2a Alaska BC Ont Que [960].

Bouteloua Lag.

GRAMINEAE

Mostly perennial grasses, native to N. and S. America; valuable as forage grasses in the western ranges of the US and to a limited extent in Canada.

1. *B. curtipendula* (Michx.) Torr., tall grama grass or side oats; known in Canada in Ont.
2. *B. gracilis* (H.B.K.) Lag. ex Steud. (*B. oligostachya* (Nutt.) Torr.), blue grama grass or buffalo grass; known in Canada from Man to

Alta; abundant in the prairie grasslands of s.e. Alta.

Bipolaris tetramera (McKinney) Shoem. (*Helminthosporium t.* McKinney): on *B. sp.* Alta 57:24.

Puccinia vexans Farl.: III on 1 Man, II III on 2 Man [93, p. 71]; 0 I unknown [15, p. 172].

Boykinia Nutt. SAXIFRAGACEAE

Perennial herbs of N. America and e. Asia.

1. *B. richardsonii* (Hook.) Gray; in arctic Alaska and Yukon.

Urocystis alaskana Zundel: on 1 Alaska [175, 292].

Brachycome Cass. COMPOSITAE

Annual or perennial herbs mostly native to Australia; one grown in the flower garden.

1. *B. iberidifolia* Benth., Swan River daisy.

Aster yellows virus (callistephus virus 1): aster yellows, jaunisse de l'aster: recorded on *B. sp.* NB 36:75, 37:73.

Brachypodium Beauv. GRAMINEAE

Annual and perennial grasses, mainly native to Eurasia.

1. *B. pinnatum* (L.) Beauv.; native to s. Europe.
2. *B. sylvaticum* (Huds.) Beauv., perennial grass of the Mediterranean region; sometimes grown for ornament.

Puccinia graminis Pers. f. sp. *phlei-pratensis* (Erikss. & Henn.) Stakm. & Piem.: moderate infection of plot of 1 Morden, Man shown to be timothy rust, 45:41.

Brassica L. CRUCIFERAE

Annual and biennial herbs, native to north temperate parts of the Old World; many widely spread as weeds and others extensively cult.

1. *B. caulorapa* Pasq., kohlrabi, chou-rave; cult. to some extent for its edible tuber.
2. *B. hirta* Moench (*B. alba* auct. non (L.) Rabh.), white mustard, moutarde blanche; in all provinces of Canada except those on the Atlantic coast; cultivar Yellow cult. in Alta for the production of mustard from the seeds.
3. *B. juncea* (L.) Coss, Indian mustard, moutarde joncée; a weed in every province of Canada, but most abundant in the west; grown occasionally for greens; also as an oilseed crop, cultivar Oriental or Brown, in Alta.

4. *B. kaber* (DC.) Wheeler var. *pinnatifida* (Stokes) Wheeler (*B. arvensis* auct. non (L.) Rabh., *Sinapsis a.* auct.), wild mustard, moutarde; one of the most common annual weeds in Canada especially in the west; naturalized from Eurasia.

5. *B. oleracea* L.; in the wild state a native of the coasts of w. Europe, from which several important cultigens have probably arisen:

5a, *B. o.* var. *acephala* DC., common kale, chou frisé; rarely grown in Canada.

5b, *B. o.* var. *botrytis* L., cauliflower, chou-fleur; widely cult. in home and market gardens.

5c, *B. o.* var. *capitata* L., cabbage, chou; a widely cult. plant in Canada.

5d, *B. o.* var. *gemmifera* Zenker, Brussels sprouts, chou de Bruxelles; cult. to a limited extent in Canada.

5e, *B. o.* var. *italica* Plenck, broccoli, chou-brocoli; grown to a limited extent in Canada.

6. *B. pekinensis* Rupr., Chinese or celery cabbage, chou chinois; cult. to some extent in Canada.

7. *B. spp.*: 7a, *B. campestris* L., field mustard, chou champêtre; widespread in Canada as a weed, especially in the east, where it replaces *B. kaber*; cult. as an oilseed crop (Polish rape) in the prairies. 7b, *B. napus* L., rape, navette; cult. as an oilseed crop (Argentine rape) in the prairies; said sometimes to escape. Disease records on these two hosts are rarely separable.

8. *B. spp.*: 8a, *B. napobrassica* (L.) Mill., Swede turnip or rutabaga, navet ou rutabaga; cult. mainly from Ont eastward for fodder and as a cash crop for the winter vegetable market. 8b, *B. rapa* L., turnip or summer turnip, navette; cult. in home gardens and to some extent in market gardens. Most of the disease records on 'turnip' concern *B. napobrassica*.

Other hosts: 9, *B. nigra* (L.) Koch. 10, *B. perviridis*.

Agrobacterium tumefaciens (Sm. & Towns.) Conn: crown gall, tumeur du collet: on 8 Alta 59:64, Sask 55:95.

Albugo cruciferarum S.F.Gray (*A. candida* (Pers. ex Lév.) Ktze., *Cystopus candidus* (Pers. ex Lév.) de Bary): white rust, albugine ou rouille blanche: on 2, 3 Alta 55:49; on 3, 4 Sask Man [93, p. 29], Que 25:81; on 5b Alta 31:37; on 5c BC 31:36; on 7 Sask 54:53, frequently in association or confused with *Perenospora parasitica*, 58:37; on 7b Man 44:29; on 8 BC [535], NB 22:61; on 9 Alta Que 47:34. Oospores from 7b germinated to form a sessile vesicular zoosporangium or one raised on the end of the discharge tube [1110].

Brassica

- Alternaria brassicae* (Berk.) Sacc. (*A. herculea* (Ell. & Mart.) J.A.Elliott): gray leaf spot, tache grise: on 1 Alta 32:40; on 4 Man 57:38, [93, p. 112]; on 5b Man [93], Ont 59:47; on 5c Alaska [175], Sask 42:40, Man [93], Ont 48:38, NS 59:45; on 5e BC 34:30; on 7 Sask Man 56:37, Man 55:43; on 8 BC 41:60, Alta 43:77, Ont 44:78, Que 25:60, NB 30:56, NS 42:72; on 8b Man [93]. An epidemic occurred on 7b in Man in the wet years 1955-56. The pathogenicity of the fungus on this host and other species of Cruciferae is described [681].
- A. brassicicola* (Schw.) Wiltshire (*A. circinans* (Berk. & Curt.) Bolle, *A. oleracea* Milbr.): black leaf spot, tache noire: on 5b BC Man 34:32, especially on inflorescence and pods of seed crops, 44:33, occasionally on seedlings, 48:40; on 5c BC PEI 31:36, Alta 44:40, Ont Que 45:49, NB 42:40, most conspicuous on seed crops affecting leaves, stems and pods, Ont 45:49, and causing some damage, BC 34:31; also on young seedlings; probably on 5c Ont 24:34, Que PEI 25:42; on 5e BC 34:30, 44:39; on 7a, 10 Que 42:71; on 8a Que 54:104, NB NS [1138].
- A. tenuis* auct. sensu Wiltshire: on 4 Sask 57:34; on curds of 5b Que 48:40; associated with a destructive pod mold of 5c Ont 52:45; on 7 Man 55:43; common after *Albugo cruciferarum* (q.v.) Sask 39:31.
- Asteroma brassicae* Chev.: on 8b Greenl [899].
- Botrytis cinerea* Pers.: gray mold, moisissure grise: on 5 Alaska [175]; in blossom blight and rot of seed crops of 5b BC 43:47, Que 45:51, NS 42:42; in rot in field but more often in storage of 5c Man 41:31, Que 34:31, NS 51:44, PEI 49:41, Nfld 56:52, 57:56; associated with severe blossom blight of 5e BC 43:44; on 8 BC 45:48; on 8a in storage, NS 44:79 et seq.; from seed of 7 Sask 59:31.
- Cercospora brassicae* (Fautr. & Roum.) Höhn. (*C. albomaculans* (Ell. & Ev.) Sacc., *Cercospora a.* Ell. & Ev.): white spot, tache blanche: on 6 Que 57:57; on 8 Ont Que 38:69, NB 27:86, NS 26:30, PEI 36:47, [1138].
- Cicinobolus cesatii* de Bary (*Ampelomyces quisqualis* Ces.): on *Erysiphe polygoni* on 7 Sask [Vanterpool in litt.].
- ?*Corynebacterium fascians* (Tilf.) Dowson: fasciation, fasciation: 5 percent of the seed plants of 5c affected in a plot, BC 47:44; on 5c BC 40:22, NB 50:52.
- Erwinia carotovora* (L.R.Jones) Holland (*Bacillus carotovorus* L.R.Jones): soft rot, pourriture molle: on 5b BC 31:37, Alta 56:55, Man 24:35, Ont 39:39, Que PEI 34:32, NS 57:55; occasionally severe under wet conditions, 40:33, 42:43; on 5c BC Man 23:76, Ont 52:45, Que 25:42, NB PEI 26:22, NS 31:35, Nfld 51:44; heaviest losses follow extremely wet weather in field or exposure to chilling or frost in poor storage; on 5d, 5e BC 54:60; on 8 BC 23:108, Alta 37:50, Man 25:60, Ont 43:77, Que NS 33:42, NB 22:61, PEI 26:30, Nfld 54:104; rarely destructive except to boron-deficient roots, 50:93.
- Erysiphe polygoni* DC. ex Méral: powdery mildew, blanc: on 5a BC 39:41; on 6 BC [50]; on 6b in greenhouse Que 39:37; on 7 Sask 39:30; on 8 BC [535], Alta 50:93, Ont 42:72, Que 39:68, NS 28:87, PEI 25:60.
- Fungi from seed: *Alternaria brassicae* (Berk.) Sacc., 5b BC Que, 5c Conn [374]. 7b Ont [479]. *A. brassicicola* (Schw.) Wiltshire, *B. spp.* BC Man Ont Que NS PEI [380]. *A. consortialis* (Thüm.) Groves & Hughes, 5b BC; *A. tenuis* auct. sensu Wiltshire, 5c BC, 8a NB, imported *B. spp.*; *Aspergillus fumigatus* Fres., 5c England; *A. wentii* Wehmer, 8b Ill; *Cephalosporium acremonium* Cda., 8a BC; *Chaetomium cochliodes* Pall., 5c Que, 8a NB, 8b Minn; *C. funicola* Cke., 5c Denmark, 8b NY; *C. globosum* Kze., 5b BC, 5c Que, 8b BC; *Cladosporium cladosporioides* (Fres.) De Vries, 8a BC; *Cunninghamella elegans* Lendner, 5c BC; *Curvularia geniculata* (Tracy & Earle) Boed., 5c Mich; *C. inaequalis* (Shear) Boed., 8b Ill; *C. pallescens* Boed., 5b BC, 8b England [374]. *Fusarium acuminatum* Ell. & Ev. and *F. poae* (Pk.) Wr., 7 Sask 59:31. *F. avenaceum* (Fr.) Sacc., 8a NB; *F. equiseti* (Cda.) Sacc., 6b BC, 6c Calif, 8a NB; *F. oxysporum* Schlecht., 6b BC; *F. sambucinum* Fckl., 6b BC; *F. s. var. coerulescens* Wr., 8a NB [334]. *Mucor adventitius* Oud. var. *aurantiacus* Lendner, 7a NB; *Oospora lactis* Fres., 5c NJ; *Paecilomyces varioti* Bainier, 8a BC; *Papularia arundinis* (Cda.) Fr., 5c England; *P. sphaerosperma* (Pers.) Höhn., 8a NS; *Penicillium cyclopium* Westling, 8b Ill [374]; *Phoma lingam* (Tode ex Fr.) Desm., 7 Sask 57:39, 8a NS [374]. *Rhizoctonia praticola* (Kotila) Saksena & Vaartaja, 7 Sask 59:31, and probably much more prevalent than this single record suggests. *R. solani* Kühn, 7 Sask 59:31; *Rhizopus nigricans* Ehr., 7 Sask 59:31. *R. stolonifer* (Ehr. ex Fr.) Vuill., 3, 7 Sask 57:39; *Sordaria fimicola* (Rob.) Ces. & de Not., 5b BC; *Stemphylium botryosum* Wallr., 5b, 5c BC, 8b Ill; *Verticillium tenerum* Nees, 5c Mich [374].
- Fusarium oxysporum* Schlecht. f. *conglutinans* (Wr.) Snyd. & Hans.: yellows, jaunisse: on 5b Man 55:59, Ont 46:37, Que 51:46; on 5c Ont 31:36, Que 51:44, [335]; on 5b, 5d Que 57:54; reported infrequently and usually in single fields, but when present, losses may be substantial Ont 50:51, Que 51:44; cultivar differences noted, 52:45.
- F. spp.*: from plants: *F. avenaceum* (Fr.) Sacc. and *F. oxysporum* f. *conglutinans* from base of 5c Que; *F. solani* (Mart.) App. & Wr. from roots, Sask; *F. acuminatum* Ell. & Ev., *F. o. var. redolens* (Wr.) Gordon from roots of 8a Man [335].
- Heterosporium variabile* Cke.: on older leaves of 5c BC [535].
- Mycosphaerella brassicicola* (Duby) Oud.: ring spot, tache annulaire: on 5b BC 48:40; occasionally on 5c, mostly seed crops, BC 41:31 et seq. [50]; on 5d BC 42:40; on 5e BC 47:43; on 7a Sask [1111; cf. 58:38, 59:30].
- M. tassiana* (de Not.) Johans.: on *B. sp.* BC [50].
- Olpidium brassicae* (Wor.) Dang. (*Asterocystis radialis* de Wild.): on roots of 7 Sask 29:11, 57:39.
- Peronospora parasitica* (Pers. ex Fr.) Fr. (*P. brassicae* Gäum.): downy mildew, mildiou: on 3 Sask Man, 4 Man [93, p. 30]; on 5a BC 40:36; on 5b BC 32:36, sometimes prevalent, 43:47; on 5c BC 43:44, NS 56:52, Nfld 49:xix, 50:51, most common on seedlings but also on seed crops, 44:40, and on imported transplants, 56:52; on 5d BC 50:51; on 5e BC 44:39, apparently more susceptible than 5b, 53:55; on 7b Sask 52:34, infection probably from oospores in refuse of a previous crop, 57:38; on 8 BC 35:44, Man 44:79, Ont 42:72, NB 27:87, NS 40:61, PEI 39:68.
- Phoma lingam* (Tode ex Fr.) Desm.: black leg, jambe noire: on 5b Que 48:39; on 5c BC 32:35, Ont 43:44, Que 48:39, NB 31:36, PEI 48:39, Nfld 51:45; heavy on pods, BC 24:31; damage to seedlings severe, Ont 44:40, Nfld 51:45, 53:56, and to transplants when untreated seed was sown, Ont 45:50; on 5d Que 48:39; on 8 Alta Ont 32:58, Que 28:86, NB 34:44, NS 29:41, PEI 32:58. The perfect state, *Leptosphaeria maculans* (Desm.) Ces. & de Not., has yet to be observed in Canada.
- Plasmodiophora brassicae* Wor.: clubroot, hernie: on 1 Que 46:38; exp. on 1, 4, 5a PEI 37:49; on 5, 7a Alaska [175]; on 5a BC 49:47; on 5b BC 28:58,

Ont 30:40, Que 29:28, NB 26:22, NS 27:58, PEI 31:37, Nfld 50:53, and sometimes severe, 47:46, 56:55, 58:53; already known in 1924 on 5c from BC and Ont to PEI 24:34; in Nfld 49:xix, where "clubroot is the most prevalent and serious disease" in small garden patches that are planted year after year to crucifers, so also along the lower St. Lawrence Valley, 25:42, on the Magdalen Islands, Que, 28:57, and in NS 51:45. Over the years clubroot has become more prevalent and destructive in the main market-garden and some muck areas in BC 48:39, Que 47:44, Ont 56:52 where on the Bradford Marsh, the whole area became contaminated from a single field after the 1954 flood. Growers must use healthy transplants and apply a fungicidal drench if heavy losses are to be avoided. On 5d Que 45:25, NB 44:30, NS 47:24; on 5e BC 47:44, 53:55, PEI 58:50; on imported transplants, 52:44; on 6 BC 28:59, Que 35:28.

On 8 BC 29:66, 50:93, Man 25:60, but unconfirmed, Ont Que 23:108, NB 22:60, NS PEI 21:62, Nfld 50:93; the most important disease of 8a in NB NS and PEI. Zoospores from the zoosporangia and resting spores are both biflagellate and heterokont, but those from the sporangia are not over half the average diameter of the latter [27]. Six physiologic races, five of which were recognized in Canadian collections, were differentiated using cultivars of 5c and 8a and certain wild *B. spp.* [29].

Pleospora herbarum (Fr.) Rabh. var. *h.* (*P. ameriae* (Cda.) Ces & de Not.): on *B. sp.* BC [50].

Pseudomonas maculicola (McCull.) Stev.: bacterial leaf spot, tache bactérienne: on 5b Alta 32:36, Ont 50:53, Que 51:46; on 5c BC 37:24, Ont 43:44; on heads of 5c imported from the US; apparently a disease of 5c in transit and storage.

Pythium debaryanum Hesse, *Rhizoctonia solani* Kühn, etc.: damping-off, fonte des semis: on 5c Alta 41:31, Sask Ont 34:31, Ont 57:54, NS 39:37, Nfld 49:xix, 50:52; from roots and crown of 7 Sask 56:37.

P. ultimum Trow: cause of a stem and curd rot of 5b BC 56:55.

Rhizoctonia solani Kühn (perfect state, *Pellicularia filamentosa* (Pat.) Rogers): wire stem, tige noire: on 5b BC 43:48, Sask 33:24, Man 44:43, Ont 49:41, Que 38:31, NS Nfld 51:46; on 5c Mack 48:39, Alta 28:58, 52:45, Man 33:23, Que 37:25, NB 36:23; on 5d NS 51:44; an important seedling disease of 5b and 5c, particularly in Ont and Que; to control, soil sterilization is practised in Essex Co., Ont, 53:56, and the incorporation of thiram into the soil about Montreal, Que, 54:61; cause also of a bottom rot of 5c NS 58:51 and head rot BC 54:61; on imported transplants of 5e 52:44; on 7 Sask 56:37, 57:38; on 8 BC 44:79, Sask 43:78, Man [93, p. 125], Que 36:46, NB 22:62, NS 40:82, PEI 29:41, 54:104; mainly recorded as a cause of storage rot; cause of a root rot of 22 Alta 58:43.

Rhizopus sp.: destructive to 8a in storage, Alta 53:87.

Sclerotinia sclerotiorum (Lib.) de Bary: sclerotinia rot, pourriture sclérotique: on 5b BC 41:33, Ont 47:47, Que 59:47; on 5c BC Man 38:29, Alta Ont 45:50, Sask 42:41, Que 24:34, NS 53:56, PEI 26:22, 44:40; heads affected in both field and storage, but loss mainly in storage; destroyed a crop of 5b following a crop of *Cheiranthus cheiri*, BC 42:43; on 7 Alta 56:37, Sask 50:38; isolate from 7 was less pathogenic than one from *Descurainia sophia*, 50:38; on 7a Sask 56:36, Man 45:37, 54:43, loss heavy; on 8 in storage BC 36:46, Sask 45:84, Que 59:64, NS 29:41, in field NS 29:41.

Streptomyces scabies (Thaxt.) Waks. & Henrici: scab, gale: on 8 BC 56:97, Alta 43:77, Ont 54:105, Que 28:87, NB 40:61, PEI 33:42.

Typhula umbrina Remsberg: on *B. sp.* BC [877]; on 8 in storage BC 39:67.

Xanthomonas campestris (Pamm.) Dowson: black rot, nervation noire: on 5b Man 41:33, Ont 28:59, Que 24:35, NB 36:24; on 5c BC PEI 23:34, Sask Man 44:40, Ont Que 20:39, NS 55:57; because the pathogen is seed-borne, losses from black rot are often heavy when the disease does occur on 5b Que 47:47, or on 5c Man 44:40, Ont 39:37, Que 33:23; on 6 Que 59:48; on 7 Ont 42:28; on 7a Man 45:37; on 8 BC 50:93, Man 44:79, Ont 39:67, NB 22:61, NS 43:78, PEI 31:57, Nfld 56:97; the hot water treatment is both effective and cheap.

Aster yellows virus (*callistephus virus* 1): yellows or sterility, jaunisse de l'aster: on 5b Alta 56:55; on 7 Sask 54:43, Man 53:41, 57:38.

Virus of the yellows type: sterility, stérilité virale: recorded on 5c NB 52:45, 53:56; on 5e NB 45:49, 47:44; on 7a NB 42:73; on 8 NB 40:62, NS 45:85, PEI 41:61.

Virus: mosaic, mosaïque: recorded on 5a BC 34:37, 35:29; on 5b BC 40:33, Alta 45:52; on 5c BC 35:26, Ont 41:32, apparently unimportant; on 8 BC 44:79; on 8a Ont 46:63, Que 52:80, NS 41:60, 42:72, PEI 40:62.

Turnip latent virus: detected in 8a in 1954, NB 55:96; the virus, aphid but not mechanically transmitted, is symptomless in 8a and 8b and only slightly affects other *B. spp.*, but produces well-marked symptoms in *Physalis floridana* and some other plants [640].

?Virus: witches'-broom, virose-balai de sorcière: on 8 NB 45:85, 47:81.

Boron deficiency, carence de bore: brown heart or water core, cœur brun: on 5b Alta 58:53, Que 42:43, NB 40:39, NS 57:55, PEI 39:39; on 5c Man 41:32, Que 42:41, PEI 43:45; although rarely reported on 5c it may be severe, 42:41, but boron mixed in the fertilizer gives practical and satisfactory control, 56:54; on 5e Que 58:50; on 8 BC 35:44, Ont 33:41, Que 32:57, NB 31:57, NS 36:46, PEI 30:55, Nfld 51:84. A destructive disease of 8a in Ont and eastward, 34:57, 42:73, particularly in a dry year, 48:72; borax applications to the soil gave good control in the Maritime Provinces, 35:44, but in Ont, on account of the high lime content of the soil in some locations, foliar sprays, 42:73, 44:80, or dusts, 45:85, were favored.

Excess boron, excès de bore: cause of injury to 8 PEI 36:46.

Magnesium deficiency, carence de magnésie: on 8 PEI 43:79.

Molybdenum deficiency, carence de molybdène: whiptail, tige en fouet: on 5b BC 49:43, Alta 58:53, Ont 39:38, Que 38:31, NB 48:41, NS 47:47, PEI 50:53; where sodium molybdate is included in the fertilizer or the plants are sprayed with the chemical when symptoms first appear, losses are negligible, 56:55.

Phosphorus deficiency, carence de phosphore: on 5c NS 53:56; on 7 Sask 57:39; on 8 PEI 48:71.

Potassium deficiency, carence de potasse: on 5c NS 55:57.

Herbicide injury: on 5c BC Ont 55:57; on 5d BC 50:51; on 5e Ont 55:56; on 8 Man 56:97, Ont NB 51:84, NS 55:96, PEI 50:94; the loss, usually from spray drift, may be high.

Intumescence: recorded on 5c Sask 56:54; attributed to drifting soil.

High temperature, température élevée: heat canker, chancre de chaleur: on 7b Man 45:37, 55:43.

Low temperature, température basse: prolonged low temperatures caused bolting of 5c NS 56:53; frost

Brassica

checked plant growth of 5b BC 43:48; of 5c BC 44:40; of 7 Sask 57:39, 58:38.

Oedema, œdème: attributed to unbalanced water relations; recorded on 5c BC [535], Ont 35:26, 59:46, Que 36:23, PEI 49:41; on imported transplants of 5e 52:44.

Braya Sternb. & Hoppe CRUCIFERAE

Arctic and boreal perennial herbs.

1. *B. glabella* Richards. (*B. pilosa* Hook.); from the western Arctic to Greenl.
2. *B. humilis* (C.A.Mey.) Robins.; Greenl to Alaska and BC.
3. *B. purpurascens* (R.Br.) Bunge; an alpine-arctic, circumpolar species.
4. *B. thorild-wulfii* Ostenf.; from w. arctic Canada to Greenl.

Mycosphaerella confinis (Karst.) Lind: on 3 Greenl [603].

M. cruciferarum (Fr.) Lindau (*Sphaerella c.* (Fr.) Sacc.): on 3 Frank [903].

M. densa (Rostr.) Lind: on 3 Frank [52].

M. tassiana (de Not.) Johans.: on 3 Greenl [602, 603]; on 4 Greenl [603].

M. tassiana var. *tassiana*: on 3 Frank [52].

Platyspora pentamera (Karst.) Wehm. (*Pleospora platyspora* sensu Rabh.): on 3 Frank [903].

Pleospora androsaces Fckl. (*Pyrenophora a.* (Fckl.) Sacc.): on 1 Mack [604].

P. cerastii Oud. (*Pyrenophora c.* (Oud.) Lind): on 3 Greenl [603].

P. comata Auersw. & Niessl (*Pyrenophora c.* (Niessl) Sacc.): on 3 Frank [604].

P. drabae Schroet. (near *P. scrophulariae* Desm. var. *spinosella* (Rehm) Wehm.): on 3 Greenl [601].

P. helvetica Niessl and *P. tragacanthae* Rabh.: on 3 Frank [52].

Selenophoma drabae (Fckl.) Petr. (*Rhabdospora d.* (Fckl.) Berl. & Vogl.): on 3 Greenl [601].

Sphaerotheca fuliginea (Schlecht. ex Fr.) Poll. (*S. humuli* (DC.) Burr. var. *f.* (Schlecht.) Salm.): on 2, 4 Frank [971]; on 3 Greenl [601].

Briza L. GRAMINEAE

Annual or perennial grasses native to Eurasia, N. Africa and S. America.

1. *B. maxima* L., big quaking grass, grande amourette; sometimes cult. for ornament and occasionally escaped.

Fusarium culmorum (W.G.Sm.) Sacc.: from blighted heads of 1 Man [93, p. 117].

Puccinia graminis Pers.: II III on 1 Man [93, p. 68].

Bromus L. GRAMINEAE

Annual, or perennial, grasses of temperate regions; the native perennial species are valuable forage grasses; one introduced perennial species

is cult. and naturalized and several annuals are weedy species introduced from the Old World.

1. *B. ciliatus* L., fringed brome, brome cilié; in Canada from Nfld and NS to BC.
2. *B. inermis* Leyss., awnless brome, brome; introduced and naturalized from Europe, a valuable pasture and hay grass, hardly a weed although abundant on roadsides in Western Canada.
3. *B. japonicus* Thunb. (*B. patulus* Mert. & Koch), Japanese brome, brome de Japon; a European annual occasionally found as a weed from Que to Sask and especially in s. Alta.
4. *B. latiglumis* (Shear) Hitchc.; recorded in Canada from NB to Sask.
5. *B. pumpellianus* Scribn., including 5a, *B. p.* var. *arcticus* (Shear) Porsild (*B. arcticus* Shear); Colo north to Alta and Alaska.
6. *B. purgans* L. (*B. ciliatus* L. var. *laeviglumis* Scribn.); in Canada from Ont to Sask. Records on 4 probably belong here and vice versa.
7. *B. secalinus* L. chess, séglin; winter annual introduced from Eurasia; in Canada most frequent in Ont, but rare in the prairies.
8. *B. tectorum* L., including 8a, *B. t.* var. *glabratus* Spenner; annual or winter annual, naturalized from Europe; in Canada from NB to BC, especially in s. Alta and interior BC.

Other hosts: 9, *B. aleutensis* Trin. 10, *B. anomalus* Rupr. (*B. porteri* Nash). 11, *B. carinatus* Hook. & Arn. 11a, *B. c.* var. *hookerianus* (Thurb.) Shear (*B. h.* Thurb.). 12, *B. catharticus* Vahl. 13, *B. erectus* Huds. 14, *B. marginatus* Nees. 15, *B. mollis* L. (*B. hordaceus* auct.). 16, *B. pacificus* Shear. 17, *B. polyanthus* Scribn. 18, *B. sitchensis* Trin. 19, *B. sterilis* L.

Acremoniella verrucosa Togn.: from seed of 2 Sask [374].

Acrospermum compressum Tode: on old *B.* spp. Man [93, p. 45].

Alternaria tenuis auct. sensu Wiltshire: from seed of 2 Sask [374].

Ascochyta hordei Hara f. *skagwayensis* Sprague: on 2 Alaska [1042, p. 595].

A. sorghi Sacc. (*A. graminicola* Sacc.): leaf spot, tache des feuilles: on blighted leaf tips of 2 Man 45:41; on 16 Alaska [1042].

Bipolaris sorokiniana (Sacc. in Sorok.) Shoem.: leaf spot, tache des feuilles: on *B.* spp. Ont, severe, 56:45; on 2 Alta 57:24, [1034].

Cladosporium herbarum Lk. and *C. malorum* Ruehle: from seed of 2 Sask [374].

Claviceps purpurea (Fr.) Tul.: ergot, ergot: on *B.* sp. Alaska [175]; on 1 BC 54:33, BC Alta [172]; on 2 BC [50], BC Alta Sask 30:35, Man 23:38, Sask Man

[93, p. 45], NB 34:25, [1138]; on 5 Alta 29:74, Sask [93]; on 13 cult. Man 23:38; ergot from rye infected 2, 4, 13; 2 very susceptible both in cult. fields and in wayside stands, being heavily attacked in the Prairie Provinces, 31:30, 34:25.

Drechslera bromi (Died.) Shoem. (*Helminthosporium b.* (Died.) Died. stat. perf. *Pyrenophora bromi* Died.): leaf blotch, tache des feuilles: on *B. spp.* Alta Sask Ont, 2 Alta Man Ont PEI [993]; on 2 Alta 40:26; in Sask and throughout Man [93, p. 120], Ont 56:48, NB 60:81; sometimes destructive, 41:25, 58:46.

Epicoccum neglectum Desm.: from seed of 2 Sask [374].

Erysiphe graminis DC. ex Mérat: on 2 Sask 25:21; a doubtful record. On 18 Alaska [1037].

Fusarium spp.: isolated from diseased parts, mainly basal, of 2 Man: *F. acuminatum* Ell. & Ev., *F. culmorum* (W.G.Sm.) Sacc., *F. equiseti* (Cda.) Sacc., *F. poae* (Pk.) Wr., *F. solani* (Mart.) App. & Wr. [355]. From seeds of 2: *F. poae* Alta; *F. acuminatum*, *F. culmorum* Sask; *F. equiseti*, *F. oxysporum* Schlecht., Ont [334]. *F. nivale* (Fr.) Ces. on 9 Alaska [1037].

F. culmorum: pathogenic isolates obtained from diseased seedlings of 2 grown in greenhouse in soil from central Sask were used to study the disease in detail [1015].

Hendersonia culmicola Sacc.: on 9 Alaska [1037].

Heterosporium phlei Greg.: on *B. sp.*, 2 Alaska [1037]; on 2 Alaska [175].

Leptosphaeria culmifraga Ces. & de Not.: on dead stems of 2 Sask [93, p. 54].

Low-temperature basidiomycete, basidiomycète frigidophile: *B. spp.* highly resistant [217]; rare on 2 Alta 46:29, [175].

Metasphaeria bromigena Sprague: on 5a Yukon; this fungus appears to be the perithecial state of *Selenophoma bromigena* [1042, p. 593].

Mycosphaerella longissima (Fckl.) Lind: on 7 Alaska [175, 1037].

M. recutita (Fr.) Johans.: on 2 Alaska [175, 1037].

M. tassiana (de Not.) Johans.: on 10 BC [50].

M. wichuriana (Schroet.) Johans.: on 1 Alta 34:98.

Nigrospora oryzae (Berk. & Br.) Petch: from seed of 2 Sask [374].

N. sphaerica (Sacc.) Mason: on 2 Man [93, p. 122].

Ophiobolus graminis Sacc.: 1 and 2 are susceptible to *O. graminis*, and wheat after 2 in the rotation is moderately affected [814]; on 1, 18 Alaska [1042].

Passalora graminis (Fckl.) Höhn. (*Scolecotrichum g.* Fckl.): on 1, 2, Alaska [175]; on 2 BC 47:37, Alta 33:108, Alta Man [1034]; on 2, 11 BC [535].

Phaeoseptoria festucae Sprague: on 18 Alaska [1042].

Pleospora harknessii (Cke. & Harkn.) Berl. & Vogl. (*P. ?vagans* Niessl): on dead stems of 2 Sask [93, p. 55].

P. karstenii Berl. & Vogl. (*P. islandica* Johans.): on 5a Mack [604].

Pseudomonas coronafaciens (Ch.Elliott) Stev. var. *atropurpurea* (Reddy & Godkin) Stapp: cholocate spot, tache bactérienne: on 2 Alta 31:30, 35:21, Sask 41:25, 57:49, Man 40:26, 43:38.

Puccinia coronata Cda. (*P. rhamni* (Pers.) Wettst.): II III on 1, 2, 5a Alaska [175, 1037]; on 1, 10 Sask 24:58; on 1 Man 24:78; on 1 Sask Man, 5, 10 Sask [93, p. 67]; on 1 Sask, 5 Alta [15, p. 153]; on 5a Yukon [1042].

P. coronata "var." *bromi* Fraser & Ledingham, non *P. coronifera* Kleb. f. sp. *bromi* Mühl.: 0 I common on *Shepherdia canadensis*, II III on 1 n. Sask;

experimentally caused heavy infection on 1, 4, 5 and moderate infection on 3, 10 and several other grasses [372].

P. coronata f. sp. *secalis* Peterson: of the *B. spp.* tested, only 7 susceptible [845]; first found when aecia on *Rhamnus cathartica*, mostly from E. Canada, were sown on grasses and tentatively designated var. "bromi," 47:20.

P. graminis Pers.: II III on 5 Sask, 15 Sask Man, 18 cult. Man [93, p. 68]; slight infection on 14 cult. Man proved to be *P. g.* f. sp. *avenae* Erikss. & Henn., 45:41; on 15 Sask [15, p. 174].

P. recondita Rob. ex Desm. (*P. clematidis* (DC.) Lagerh., *P. rubigo-vera* (DC.) Wint., *P. r.-v.* var. *agropyri* (Ell. & Ev.) Arth., *P. r.-v.* var. *agropyrina* Erikss.) Arth., including *P. tomipora* Trel.): leaf rust, rouille des feuilles: II III on 1 Alta 33:108, Que 52:40; on 1 Alta Sask Man Ont NS, 4 Sask Man, 5 BC Alta Sask, 6 Ont, 10 Alta, 11a BC [15, p. 178]; on 1 Alta Sask Man, 4 Man, 5 Alta Sask, 6 Man, 10 Sask [93, p. 71]; on 2 Man 24:17, improbable; on 8 Ont 54:53; on 11 BC 44:35, 47:37, [535]; on 11a BC 33:108; on 15 BC [535].

P. striiformis West. (*P. glumarum* (Schmidt) Erikss. & Henn.) II III on 1 Alta, 14, 18 BC 31:4; on 1, 11a, 14, 18 BC mainly [770]; on 11 BC [535].

Pyrenophora bromi (Died.) Drechs. (stat. conid. *Drechslera b.* (q.v.): on dead overwintered leaves and culms of 2 Sask Man [93, p. 56], Man 55:50, Ont 57:48.

Pythium graminicola Subram. (*P. arrhenomanes* Drechs., *P. a.* var. *canadensis* Vanterpool & Truscott): from 2 Sask 33:20, 34:7, [93, p. 31; 1034], Man 53:51; reduces dry weight of plants, 41:25.

P. ultimum Trow: from diseased roots of 2 Man 53:51.

Ramularia pusilla Ung. (*Ovularia hordei* (Cav.) Sprague): on *B. spp.*, 2 Alaska [175]; on 2 Alaska [1037, 1042]; on 5a Yukon [1042].

Rhynchosporium secalis (Oud.) Davis: scald, échaudage: on 1, 2 Alaska [175]; on 1 Alaska [1037]; on 2 Alta 30:35, Man 43:38, Sask 57:49, Ont 56:45, NB 60:80.

Rosellinia limoniiiformis Ell. & Ev.: from seed of 2 Sask [374].

Sclerotinia borealis Bubák & Vleugel: on 2, 13 cult. BC [377]; isolated from 2 Alaska [592].

Selenophoma bromigena (Sacc.) Sprague & Johnson (*Septoria b.* Sacc.): leaf spot, tache des feuilles: on 2 Alaska [175, 1037], Alta Sask 20:16, Sask Man [93, p. 137], BC Alta Sask Man [1034], PEI [1138]; common on 2 in the prairies and occasionally severe; on 5 Alta 24:58; on 11 Yukon [1042]; from seed of 2 Sask [374].

S. obtusa Sprague & Johnson: from seed of 2 [374].

Septoria bromi Sacc.: on 1 Mack 40:101; on 2 Man [91, p. 137], Alta Man [1034].

S. jaculella Sprague: on 18 Alaska [1037, 1042].

Sordaria fimicola (Rob.) Ces. & de Not.: from seed of *B. sp.* Sask [93, p. 49].

Stagonospora bromi H.L.Sm. & Ramsb.: on 1 NB 60:57; on 5 Alaska [175, 1037]; on 16 Alaska [1042].

Urocystis agropyri (Preuss) Schroet.: on 1 Alta 31:119, [292].

Ustilago bullata Berk. (*U. bromivora* (Tul.) Fisch. v. Waldh.): smut, charbon: on 1 Que, 8, 8a, 15 BC [957]; on 1 Sask and by inoculation on 4, 5 [313; 93, p. 61]; on 1 Alta Sask, 8 BC Ont, 12 Alta, 15 BC Alta Ont, 17 BC Alta [292]; on 1 NB 60:57; on 19 BC [535].

Nematodes: cause reddish galls along the midrib of leaves of 2 Man 33:108.

Bromus

Virus: barley yellow dwarf virus: from *B. sp.* Alta, 19 Ont [1036].

Bupleurum L.

UMBELLIFERAE

Smooth annual or perennial herbs, mostly Old World species.

1. *B. americanum* Coult. & Rose, arctic Alaska and Yukon.

Pleospora penicillus (Schm.) Fekl. var. *p.* (*P. chrysospora* Niessl, *Pyrenophora c.* (Niessl) Sacc.): on 1 Alaska [175], 604].

Puccinia bupleuri Rud.: on 1 Alaska [175].

Buxus L.

BUXACEAE

Evergreen shrubs, native to both the Old and New Worlds; two species cult. for ornament.

1. *B. sempervirens* L., common box; native to Europe, n. Africa and w. Asia.

Ceuthospora buxi (Fr.) Petr. (*Blennoria b.* Fr.): reported on 1 Ont 28:89.

?*Gloeosporium louisiae* Bäuml. [*Sarcophoma mirbellii* (Fr.) Höhn.]: reported on leaves of 1 Ont 28:88.

Macrophoma candollei (Berk. & Br.) Berl. & Vogl.: on leaves of 1 BC 37:73, Ont 28:89.

Phomopsis sticticta (Berk. & Br.) Trav.: on 1 BC [535]; may be imperfect state of *Diaporthe eres* Nits. [fide 3].

Phyllosticta [*Pauerswaldii* Allesch.]: on 1 BC [535].

Verticillium buxi (Lk.) Auersw. & Fleischhack and *Volutella buxi* (DC. ex Fr.) Berk & Br.: reported on 1 Ont 28:89.

Cakile Hill

CRUCIFERAE

Fleshy annuals of N. America, Europe and Africa.

1. *C. edentula* (Bigel.) Hook. var. *edentula*, sea rocket, caquillier; sea coast of e. N. America, Iceland and Azores.

Peronospora cakiles Savile: on 1 Que NS [956, p. 197].

Caladium Vent.

ARACEAE

Herbaceous plants of tropical America, two species cult. for their ornamental foliage in the s. US or under glass further north.

Erwinia carotovora (L.R.Jones) Holland: soft rot, pourriture molle: on tubers from Florida intercepted in Ont 55:119.

Calamagrostis Adans.

GRAMINEAE

Perennial grasses of cool and temperate regions; the species native to N. America all

belong to the section *Deyeuxia* Hack., some of which are important forage grasses for grazing or hay.

1. *C. canadensis* (Michx.) Nutt., bluejoint grass, foin bleu; including 1b, *C. c.* var. *robusta* Vasey, and 1c, *C. c.* var. *scabra* (Presl) Hitchc. (*C. langsдорфii* auct. Am. non Trin.); in Alaska, Greenl and in Canada from Nfld to BC and the Yukon.
2. *C. inexpansa* Gray (*C. hyperborea* auct. non Lange, *C. americana* Scribn., *C. elongata* Rydb.); from Greenl and Nfld to BC and Alaska.
3. *C. montanensis* Scribn.; from Man to Alta in Canada.
4. *C. neglecta* (Ehr.) Gaertn., Mey. & Scherb.; from e. Siberia and Alaska to Greenl, Labr, Nfld, NB and NS.
5. *C. nutkaensis* (Presl) Steud.; along the coast from Alaska to Calif.
6. *C. purpurascens* R.Br., including 6a, *C.p.* var. *maltei* Polunin; widespread from east-central Siberia to Alaska, Greenl and Que.
7. *C. rubescens* Buckl.; BC and south into the US.

Other hosts: 8, *C. phragmitoides* Hartm. 9, *C. stricta* Koel.

Acremoniella sp.: on 1c Alaska [1037].

A. alascensis Sprague: on 1c Alaska [1042, p. 595].

Low-temperature basidiomycete, basidiomycète frigidophile: isolated from 1 Alaska [592]; from 1c Alaska [1042].

Cladosporium herbarum (Fr.) Lk.: on 1 Alaska [175].

Claviceps purpurea (Fr.) Tul.: ergot, ergot: on *C. spp.* Sask Man [93, p. 45]; on 1 BC [50], Alta 30:95; on 1 BC Alta Man NS, 1c Alaska, 2 Sask, 5 Alaska [1034]; on 1 BC Alta, 2, 4 Alta Sask [172]; on 1 NS 43:38, [1138]; on 1c, 5 Alaska [175]; on 2 Alta 25:77, 56:45, Sask 22:23, 44:36; prevalent on 1 in some years, 55:50; on 1c, 5 Alaska [1037].

Colletotrichum graminicola (Ces.) G.W. Wils.: anthracnose, anthracnose: on 1, 6 Alaska [175]; on 1 Que 59:42, Ont [1041]; on 5 Alaska [1037, 1042]; on 6 Alaska [1037].

Coniothyrium psammae Oud.: on 1c Alaska [1037].

Darlucula filum (Biv.-Bern.) Cast.: on 1c Alaska [1037].

Dasyscyphus carneolus (Sacc.) Sacc.: on 1 Alaska [175].

Diplodia borealis Lind: on 6 Frank [604, p. 127].

D. calamagrostidis Dearn.: on 6 Mack [250, p. 20C].

Ditylenchus graminophilus (Goodey) Filipjev: leaf gall nematode, galle nématique des feuilles: on 1 Ont Nfld 52:40, Que 49:xv, 50:54.

Drechslera catenaria (Drechs.) Ito and *D. tritici-repentis* (Died.) Shoem.: on 1 Ont [993].

Epichloë typhina (Pers.) Tul.: choke, quenouille: on *C. sp.*, 2 Sask [93, p. 46].

Fusarium avenaceum (Fr.) Sacc.: on 1 NB 60:81.

F. nivale (Fr.) Ces.: on 1c Alaska [1037].

Hadrotichum lineare Pk.: on 1b Alaska [1037]; on 1c Alaska [175].

Hendersonia crastophila Sacc.: on 1c Alaska [175, 1034, 1037]; on 1c Nfld, 6 Greenl [604]; on 8 Greenl [899].

H. culmicola Sacc. var. *minor* Sacc.: on 1 Alaska [175]; on 1c Alaska [1037].

Heterosporium phlei Gregory: on 1 Alaska [175]; on 1c Alaska [1037].

Leptosphaeria culmifraga Ces. & de Not.: on 1 BC [50]; on 5 Alaska [175].

L. fuckelii Niessl: on 4 Greenl [902].

L. typharum (Desm.) Karst., sensu Bres.: on C. spp. BC [50].

Lophodermium arundinaceum (Schrad. ex. Fr.) Chev.: on 1 Alaska [175]; on 1c Alaska [1038]; on 2, 6, 8, 9 Greenl [899]; on 4 Greenl [902]; on 6 Greenl [901].

Mastigosporium rubricosum (Dearn. & Barth.) Nannf.: on 1c Alaska BC Alta [1034]; on 1, 1c Alaska [175]; on 1 NB 60:82; on 1c, 5 Alaska [1037].

Mycosphaerella tassiana (de Not.) Johans. (*Sphaerella* t. de Not.): on C. spp. BC [50]; on 8 Greenl [899].

M. tulasnei (Jancz.) Lindau: on 2 Alaska [1038].

Passalora graminis (Fckl.) Höhn. (*Scolecotrichum* g. Fckl.): on 1c Alaska [1037], Alta [1034].

Phaeoseptoria calamagrostidis Sprague: on 1c Alaska [1042].

Phyllachora graminis (Pers. ex. Fr.) Fckl.: tar spot, rayure goudronneuse: on 1 Sask [93, p. 47]; Que 32:101, 56:45, [1034]; on 1c Alaska [175, 1037].

Physalospora leptosperma Rostr.: on dry stems of 6 Greenl [899, p. 548].

Platyspora pentamera (Karst.) Wehm. (*Clathrospora* p. (Karst.) Berl.): on 6 BC [50].

Pleospora herbarum (Fr.) Rabh.: on 4 Greenl [902].

Puccinia coronata Cda.: crown rust, rouille couronnée: II III on 1 Alaska [175, 1038], Man 33:108, Ont [828], NB 60:82, NS 52:40, [1138]; on 1 BC Sask Man NS, 2, 3 Sask, 7 Alta [15, p. 153]; on 1c Alaska [1037]; on 2 Alta 24:58; on 2, 3 Sask [93, p. 67]; on 6 Yukon [1042].

P. coronata "var." *calamagrostis* Fraser & Ledingham: II III abundant on C. spp. in n. Western Canada in association with 0 I on *Rhamnus alnifolia*; under artificial conditions heavy on 1, 3 and moderate on 2 [312].

P. coronata "var." *elaeagni* (Fraser & Ledingham: I only on *Elæagnus commutata* and II III on 3 Sask [312].

P. pygmaea Erikss.: on 5 Alaska [175, 1037].

Ramularia pusilla Ung. (*Ovularia* p. (Ung.) Sacc. & D. Sacc.): on 1c Alaska [1037].

Rhynchosporium orthosporum Caldwell: on 1c Alaska [1037].

Sclerotium rhizodes Auersw.: on 1 Alaska [175, 1037].

Selenophoma drabae (Fckl.) Petr. (*Septoria nebulosa* Rostr.) ? on 1 Man [93, p. 139]; on 8, 9, Greenl [899, p. 575].

S. everhartii (Sacc. & Syd.) Sprague & Johnson: on 1 Alaska Sask, 2 Greenl [1034]; on 1c Alaska [1037]; on 6 Yukon [1042]; on 6a Keew [1041].

Septogloeum oxysporum Sacc., Bomm. & Rouss.: on 1 Alaska [50], Alta [1034]; on 1c Alaska [1037].

Septoria arctica Berk. & Curt.: on 1c Alaska [1037, 1042]; on 5 Alaska [175, 1034, 1037].

S. avenae Frank: on 1c Alaska [1037].

S. gramineum Desm. (probably *S. arctica*, fide Sprague): on C. sp. Alaska [175].

?*Stagonospora simplicior* Sacc. & Berl.: on 1c Alaska [1042]; on 2 Man [1041].

Typhula incarnata Lasch ex Fr.: on 1c Alaska [1042].

Ustilago calamagrostidis (Fckl.) Clint.: stripe smut, charbon en stries: on 1 Alaska [175]; on 1c Que [953]; on 1 Alaska, 1c Alaska Alta Que, sub *U. striiformis*, [292, 1037]; on 1c Alaska [1037].

Calamovilfa (Gray) Hack. GRAMINEAE

Rather tall perennial grasses, native to N. America.

1. *C. longifolia* (Hook.) Scribn., big sand grass; in Canada from Ont to Alta and Mack; of some value as forage.

Claviceps purpurea (Fr.) Tul.: ergot, ergot: collected on 1 near Penhold, Alta 53:51, [172].

Drechlera tritici-repentis (Died.) Shoem.: on 1 Ont [993].

Leptosphaeria typharum (Desm.) Karst., sensu Berl.: on 1 BC [50].

Puccinia amphigena Diet.: leaf rust, rouille des feuilles: II III reported on 1 Alta 24:58; common across Sask and in w. Man [93, p. 65], and in Sask Man Ont [15, p. 145], but its presence in Canada is doubtful [828].

P. sporoboli Arth.: II III on 1 Alta Sask Ont [828]; the basal pores of the urediniospores of *P. sporoboli* serve to separate this species from *P. amphigena* (q.v.), where the pores are scattered [15, p. 135].

Calceolaria L. SCROPHULARIACEAE

Mostly perennial herbaceous or sometimes woody plants, from Mexico to the Andes of Peru and Chile; a few cult. for ornament.

Botrytis cinerea Pers.: on C. sp. Alaska [175].

Tomato spotted wilt virus (lycopersicum virus 3): spotted wilt, tache de bronze: caused moderate damage in greenhouse Que 44:105; infection apparently spread from affected *Salvia*.

Calendula L. COMPOSITAE

Annual or perennial herbs native to the Mediterranean region, Canary Islands and Iran.

1. *C. officinalis* L., pot marigold, souci; annual of s. Europe, widely cult. as a garden flower or under glass for cutting.

Botrytis cinerea Pers.: gray mold, moisissure grise: on 1 Alaska [175].

Erysiphe cichoracearum DC. ex Mérat: powdery mildew, blanc: on 1 but no clystothecia found Man 45:109.

Sclerotinia sclerotiorum (Lib.) de Bary: stem rot, pourriture sclérotique: on ?1 PEI 37:73.

Aster yellows virus (callistephus virus 1): aster yellows, jaunisse de l'aster: on 1 Alta 39:101, Sask 38:98, Man 31:90, 44:105, NB 30:86, 33:65, NS 50:121, PEI 34:81; infection frequently high in NB NS PEI, and less often in Sask 53:114.

Cucumber mosaic virus (cucumis virus 1): mosaic, mosaïque: on two plants of ?1 in garden NB 57:111.

Calla L.

ARACEAE

A monotypic genus, native to N. America and Eurasia.

1. *C. palustris* L., water arum or water calla, choucalles; a low perennial boreal herb growing in cold bogs, Nfld, and NS across Canada to Alaska and south.

Cercospora callae Pk. & Clint.: on 1 NS [1138].

Callistephus Cass.

COMPOSITAE

Annual of China and Japan; an important garden and cut flower of late summer.

1. *C. chinensis* (L.) Nees (*C. hortensis* Cass.), China aster, rein-marguerite.

Alternaria tenuis auct. sensu Wiltshire: on *C. sp.* Alaska [175].

Botrytis cinerea Pers.: stem or flower blight, moisissure grise: on 1 Alaska [175], BC Ont 30:86, PEI 37:74.

Coleosporium asterum (Diet.) Syd. (*S. solidaginis* (Schw.) Thüm.): red rust, rouille rouge: II III on 1 Man 23:117, [93, p. 63], Ont 52:111, Que 24:53, NB 29:67, NS 36:74, [1138].

Erysiphe cichoracearum DC. ex Méral: powdery mildew, blanc: on *C. sp.* BC [50]; on 1 BC 33:66.

Fusarium oxysporum Schlecht. f. *callistephi* (Beach) Snyd. & Hansen (*F. conglutinans* Wr. var. *callistephi* Beach): wilt, flétrissure fusarienne: on 1 BC Alta Man Ont Que NB PEI 24:53, Sask 29:67, NS 38:98, [1138]. The pathogen has often been destructive; resistant strains or cultivars were resistant in limited tests in Alta 38:98, 39:101, 45:109; reputedly resistant cultivars were severely affected in Man 47:104, 49:102, [93, p. 117].

Fusarium spp.: *F. acuminatum* Ell. & Ev. and *F. oxysporum* f. *callistephi* isolated from basal parts of wilted 1, *F. equiseti* (Cda.) Sacc. from discolored basal parts [335].

Phytophthora cryptogea Pethybr. & Laff.: associated with a foot rot, mildiou du pied, that caused heavy losses in a commercial planting of 1 Que 46:82; also on 1 BC [535].

Rhizoctonia solani Kühn: stem rot, rhizoctone commun: on 1 BC 30:87.

Sclerotinia sclerotiorum (Lib.) de Bary (*S. libertiana* Fckl.): stem rot, pourriture sclérotique: on 1 BC 36:74, Alta 35:66, Que 34:82, NB 22:184.

Septoria callistephi Gloyer: leaf spot, tache septorienne: on 1 Man 23:117, [93, p. 137].

Verticillium albo-atrum Reinke & Berth.: wilt, flétrissure: isolated from wilted plants of 1 BC 51:111.

Aster yellows virus (*callistephus virus* 1): aster yellows, jaunisse de l'aster: on 1 BC Sask 29:66, Man Ont Que NB PEI 24:54, Alta NS 25:69, and as far north as Ile à la Crosse, Sask 52:111. The most destructive disease of 1 and often epidemic from Ont eastward and in Man and Sask, making the growing of this attractive annual very hazardous.

Calochortus Pursh

LILIACEAE

Cormous herbs of w. N. America, some of which are cult.

1. *C. apiculatus* Baker; in Alta and BC and south to the US.
2. *C. macrocarpus* Dougl.; in BC and south into the US.

Puccinia calochorti Pk.: 0 I II III on 1, 2 BC [963; cf. 15, p. 276].

Caltha L.

RANUNCULACEAE

Succulent perennial herbs of the north temperate zone.

1. *C. biflora* DC.; Alaska.
2. *C. leptosepala* DC., elkslip; Alaska, Alta and southward.
3. *C. palustris* L., marsh marigold or cowslip, souci d'eau, including 3a, *C. p. ssp. asarifolia* (DC.) Hult.; Labr, Nfld, and NS to Alaska and Eurasia.

Botryotinia calthae Hennebert & M.E.Elliott in Hennebert & Groves: apothecia on 3 Que, conidia on 3 Ont Que [432, p. 343].

Erysiphe polygoni DC. ex Méral: on 3 Man [93, p. 44].

Pseudopeziza calthae (Phill.) Massee (*Fabraea rousseauana* Sacc. & Bomm.): on leaves of 2 BC [535; cf. 973].

Puccinia areolata Diet. & Holw.: 0 I II III on 1, 2, 3a Alaska [175]; on 2 BC Sask [15, p. 237]; *P. nephrophyllidii* Mains reported on *Nephrophyllidium crista-galli* (Menz.) Gilg. Alaska [175] is this rust on 1 [11].

P. calthae Lk.: 0 I II III on 3 Man Ont [15, p. 237]; II III on 3 Man 31:110, [93, p. 66].

P. calthicola Schroet.: 0 I II III on 3 Man [15, p. 287]; II III on 3 Sask Man [93, p. 66].

P. gemella Diet. & Holw.: III on 2 Alaska [15, p. 237; 175].

Ramularia calthae Lindr.: on 2 Alaska [983].

Verpatinia calthicola Whetz.: on 1 Ont [378].

Camassia Lindl.

LILIACEAE

Bulbous herbs of mountain meadows of temperate N. America; bulbs were eaten by Indians; sometimes planted for their showy flowers.

1. *C. quamash* (Pursh) Greene, quamash, quamash; s.w. Alta and BC.

Botrytis cinerea Pers.: cause of a blossom blight of camass, *C. sp.* BC [535].

Urocystis colchici (Schlect.) Rabh.: on 1 BC [963].

Camelina Crantz

CRUCIFERAE

Erect annuals or winter annuals, native to Europe or Asia.

1. *C. microcarpa* Andr., false flax; widespread in Canada, especially in the west.

2. *C. sativa* (L.) Crantz, false flax, sésame bâtard; less abundant than 1 and again being grown experimentally as an oilseed crop.

Albugo cruciferarum S.F.Gray (*A. candida* (Pers. ex Lév.) Kuntze): on 1 Man [93, p. 29].

Peronospora parasitica (Pers. ex Fr.) Fr. (*P. camelinae* Gäum.): on 1 Man [93, p. 32]; on 2 Man 55:52.

Plasmodiophora brassicae Wor.: on 1 PEI [1138].

Camellia L.

THEACEAE

Evergreen trees or shrubs, native to tropical and subtropical Asia, grown for their showy flowers and handsome foliage.

1. *C. japonica* L.; native to China and Japan.

Leptosphaeria camelliae Cke. & Masee: stem spot, tache de la tige: on twigs of *C. sp.* BC 32:87, [50].

Pestalotia sp.: on leaves of 1 from Oregon 54:130.

?Virus: mosaic, mosaïque: on *C. sp.* Ont 50:122.

Nonparasitic: cork spot, liège: on leaves of *C. sp.* BC 53:115.

Campanula L.

CAMPANULACEAE

Biennial or perennial herbs mostly of the northern hemisphere, mainly of Europe; many cult. for ornament.

1. *C. aparinoides* Pursh, marsh bluebell; in Canada from central Man to NS.
2. *C. glomerata* L., clustered bluebell, ganteline d'angleterre; native to Eurasia, escape from cultivation in n.e. N. America; also 1a, *C. g.* var. *dahurica* Fisch., probably of garden origin.
3. *C. macrostyla* Bois. & Heldr.; native to Asia Minor.
4. *C. medium* L., Canterbury bells, carillon; native to s. Europe, cult. and sporadic about old homesteads.
5. *C. persicifolia* L., paper bellflower, bâton de Jacob; native to Eurasia, persists sporadically.
6. *C. rapunculoides* L., bellflower, campanule; native to Eurasia, a weedy, spreading, persistent plant.
7. *C. rotundifolia* L., harebell or bluebell, clochettes bleus; native to N. America and Eurasia, widely distributed in boreal regions and south in Canada to NS. 7a, *C. r.* var. *intercedens* Witasek, Que.
8. *C. uniflora* L.; arctic regions of N. America and Eurasia.

Other host: 9, *C. linifolia* Scop.

Ascochyta sp.: leaf spot, tache des feuilles: on 2a, 3 Man 42:98; on 7 Greenl [900].

Botrytis cinerea Pers.: gray mold, moisissure grise: on *C. sp.* Alaska [175]; on 5 Que 55:120.

Cladosporium herbarum Lk.: on 7 Greenl [901].

Coleosporium campanulae Lév. ex Kickx: rust, rouille: II III on 5 BC 36:72, Ont 42:98, on 6 Ont NS 37:72, Que 44:106; on 7 Ont Que NS Nfld [956]; on 7a Que 46:82; physiologic race specialization was evident in BC 36:72 and Ont 43:104, 46:82; the species is not distinct morphologically from *C. tussilaginis* (Pers.) Lév.

Coniothyrium olivaceum Bon.: on 8 Greenl [601].

Leptosphaeria doliolum (Pers.) de Not.: on 7 Greenl [900].

Mollisia atrata (Pers.) Karst.: on 7 Greenl [900].

Mycosphaerella minor (Karst.) Johans.: on *C. sp.* Labr [52].

M. tassiana (de Not.): Johans. (*M. pachyasca* (Rostr.) Vesterg., *Sphaerella p.* Rostr.): on *C. sp.* BC [50]; on 7, 8 Greenl [899]; on 7 Greenl [901]; on 8 Frank [604], Greenl [601, 603].

Phoma complanata (Tode ex Fr.) Desm.: on 8 Greenl [603].

Phyllosticta palliariaefoliae Allesch.: leaf spot, tache foliaire: on leaves of 5 Ont 45:109.

P. ?carpathica Allesch.: on leaves of *C. sp.* Man 44:106.

Pleospora cerastii Oud. (*Pyrenophora c.* (Oud.) Lind): on 8 Mack [604].

P. comata Auersw. & Niessl (*Pyrenophora c.* (Niessl) Sacc.): on 7 Greenl [901].

P. helvetica Niessl: on 7 Que [53].

P. herbarum (Fr.) Rabh.: on *C. sp.* BC [50]; on 7, 8 Greenl [899]; on 8 Frank [52, 903], Greenl [902].

P. herbarum var. *h.* (*P. armeriae* (Cda.) Ces. & de Not.): on *C. sp.* BC [52].

P. penicillus (Schm.) Fckl. var. *p.* (*Pyrenophora chrysospora* (Niessl) Sacc.): on 8 Mack [250], Greenl [601, 603].

P. phaeospora (Duby) Ces. & de Not.: on 7 Que [53].

P. scrophulariae (Desm.) Höhn. var. *s.* (*P. media* Niessl var. *obtus* Wehm.): on *C. sp.* BC [50].

P. tragacanthae Rabh.: on 7 Labr, 8 Que [52].

Puccinia campanulae Carmichael: on 7a Que 46:82; on 8 Greenl [899].

Ramularia macrospora Fres.: leaf spot, tache ramulaire: on 4 BC 41:88, [535]; on 9 Alaska [175].

Sclerotinia sclerotiorum (Lib.) de Bary: stem rot, pourriture sclérotique: on *C. sp.* BC 32:87; on 4 BC 50:122, PEI 36:73.

Selenophoma drabae (Fckl.) Petr. (*Rhabdospora d.* (Fckl.) Berl. & Vogl.): on 8 Greenl [601].

Septoria sp.: on *C. sp.* Man 43:104.

S. ?campanulae (Lév.) Sacc.: on 1 Man [93, p. 137].

Aster yellows virus (callistephus virus 1): aster yellows, jaunisse de l'aster: on *C. sp.* NB 35:60.

?Virus: green blossom, virescence: on *C. sp.* BC 42:98.

Canna L.

CANNACEAE

Tuberous and rhizomatous perennial herbs of tropical America, cult. for summer planting to produce subtropical and floral effects.

1. *C. generalis* Bailey; "the common flowering cannas, balisiers, in many named varieties;" a cultigen.

Botrytis cinerea Pers.: gray mold, moisissure grise: on *C. sp.* Ont 57:123.

Canna

Erwinia carotovora (L.R.Jones) Holland: soft rot, pourriture molle: affected rhizomes of *C. sp.* Man 38:98.

Fusarium spp.: *F. acuminatum* Ell. & Ev., *F. oxysporum* Schlecht., *F. sambucinum* Fckl. var. *coeruleum* Wr., and *F. solani* (Mart.) App. & Wr. isolated from decayed roots or basal parts of *I* Man [335].

Virus: mosaic, mosaïque: on *C. sp.* Ont 58:113.

Cannabis L.

CANNABINACEAE

A tall annual of temperate Asia, widely grown for fiber.

1. *C. sativa* L., hemp, or marijuana, chanvre; sporadic in Que and to BC and the US; also grown commercially in the US.

Fusarium sp.: on *I* Alta 29:24.

Sclerotinia sclerotiorum (Lib.) de Bary (*S. libertiana* Fckl.): stem rot, pourriture sclérotique: on *I* Ont 26:11, NS 25:22.

Septoria cannabina Pk.: on *I* PEI 25:22, [1138].

S. cannabis (Lasch) Sacc.: leaf spot, tache septorienne: on *I* Man [93, p. 137].

Capsella Medic.

CRUCIFERAE

Annuals or winter annuals, native of Eurasia.

1. *C. bursa-pastoris* (L.) Medic., shepherd's purse, bourse-à-pasteur; native to Europe; one of the most common weeds in Canada.

Albugo cruciferarum S.F.Gray (*A. candida* (Pers. ex Lév.) Kuntze, *Cystopus candidus* Pers. ex Lév.): white rust, rouille blanche: on *I* BC [535], Sask Man [93, p. 29], Ont 30:95, Que 25:77, [8], NB 29:74, NB NS PEI [1138], PEI 32:101.

Peronospora parasitica (Pers. ex Fr.) Fr.: downy mildew, mildiou: on *I* Alaska [175], BC [535], Alta 23:123, Sask Man [93, p. 30], Que NB PEI 24:58, Que [8].

Plasmiodiophora brassicae Wor.: on *I* PEI 50:93.

Ramularia armoraciae Fckl.: on *C. sp.* Alaska [175].

Capsicum L.

SOLANACEAE

Perennial woody plants, native to Central and S. America and one species to Japan; usually grown as herbaceous annuals.

1. *C. frutescens* L., red pepper, piment; cult. for its edible fruits and composed of various horticultural forms.

Alternaria spp., in part probably *A. solani* (Ell. & Martin) Jones & Grout: black fruit rot and leaf spot, early blight, pourriture noire des fruits et tache des feuilles: on *I* Man 20:41, Ont 33:23, 36:28, Que 34:38; *A. spp.*, especially *A. tenuis* auct. sensu Wiltshire, are important secondary invaders after sunscald and blossom-end rot.

A. consortialis (Thüm.) Groves & Hughes (*Stemphylium consortiale* (Thüm.) Groves & Skolko): from fruit affected by blossom-end rot BC 51:55.

A. solani: early blight, brûlure alternarienne: on *I* Ont 49:42.

Aphanomyces cladogamus Drechs.: damping-off, fonte des semis: on *I* Ont; less pathogenic than *Pythium ultimum* and *Rhizoctonia solani* (q.v.) [696].

Botrytis cinerea Pers.: gray mold, moisissure grise: on seedlings Ont 48:48 et seq.; from wilted plants BC 43:57.

Colletotrichum spp., mainly *C. coccodes* (Wallr.) Hughes (*C. atramentarium* (Berk. & Br.) Taub., *C. phomoides* auct. non (Sacc.) Chester): anthracnose, anthracnose: on *I* Ont 50:62, 60:45, NS 49:52.

Diaporthe phaseolorum (Cke. & Ell.) Sacc. var. *sojae* (Lehman) Wehm.: on fruits Ont 47:56.

Erwinia carotovora (L.R.Jones) Holland: soft rot, pourriture molle: affected an appreciable number of fruits, both green and ripe, in Essex Co., Ont 47:56, after attack by the European corn borer, *Pyrausta nubilalis* Hübner [691]; again heavy in 1949 when the role of the insect in spreading the infection was experimentally demonstrated [693]; with better insecticides available, loss from soft rot is no longer serious.

Fungi from seed: of *I*: *Alternaria tenuis* auct. sensu Wiltshire, Ont; *Aspergillus flavus* Lk., *A. niger* v. Tiegh., Conn; *A. ochraceus* Wilhelm, NJ; *A. repens* (Cda.) de Bary, *Aureobasidium pullulans* (de Bary) Arn., Mich; *Chaetomium aureum* Chivers, NJ; *C. bostrychodes* Zopf, Mich; *C. cochliodes* Pall., *C. reflexum* Skolko & Groves, *Cunninghamella elegans* Lendner, Ohio; *Curvularia lunata* (Wakker) Boed., Mich; *Epicoccum neglectum* Desm., Conn; *Fusarium oxysporum* Schlecht., Mich NJ; *Gloeosporium piperatum* Ell. & Ev., Ont; *Nigrospora sphaerica* Sacc.) Mason, Mich; *Petriella asymmetrica* Curzi, *Sordaria fimicola* (Rob.) Ces. & de Not., Ont [374].

Fusarium equiseti (Cda.) Sacc.: from basal parts of wilted plants Man [335].

Gloeosporium piperatum Ell. & Ev. [*Colletotrichum gloeosporioides* Penz.]: reported on fruits Ont 47:56, but confused with *Colletotrichum coccodes* (q.v.).

Helicotylenchus erythrinae (Zimmerm.) Golden: spiral nematode: heavy infection in two fields of *I* Ont 61:73.

Macrophomina phaseoli (Maubl.) Ashby (*Sclerotium bataticola* Taub.): charcoal rot, pourriture charbonneuse: on fruits Ont 33:29.

Peronospora tabacina Adam: downy mildew, mildiou: on seedlings Ont 59:51.

Phytophthora ?capsici Leonian: fruit rot, pourriture des fruits: on *I* BC 48:48, 49:59.

Pythium spp., *P. ultimum* Trow and *Rhizoctonia solani* Kühn: damping-off, fonte des semis: in seedlings Ont 47:56; losses sharply reduced by treating seedbed with thiram, 48:48, and more recently by steam sterilization or fumigation of the soil before seeding, 53:64; also in Man 45:51, Que 55:69.

P. ultimum: leak, pourriture aqueuse: on plants, BC 44:51.

Rhizoctonia solani and *Fusarium* sp.: isolated from plants affected by root rot Alta 57:66.

Sclerotinia sclerotiorum (Lib.) de Bary: rot, pourriture sclérotique: affected plants BC 49:53, and fruits BC 56:66.

Verticillium spp.: wilt, flétrissure verticillienne: on plants in BC 50:63, Ont 42:50; sometimes destructive BC 56:66, Ont 49:53; the cultivar Vinedale very susceptible Ont 58:62.

Xanthomonas vesicatoria (Doidge) Dowson: bacterial spot, tache bactérienne: on fruit BC 55:69, and on foliage and fruit Ont 42:50; the seed-borne nature of the pathogen often observed Ont 59:53, 61:74;

losses often heavy, 56:67, 58:62; apparently cultivar differences in susceptibility occur, 57:66.

Virus: initially recorded as mosaic in BC 36:28, 37:31, Man 38:37, Ont 31:43, Que 42:57, NB 40:40, NS 44:52, and as infectious chlorosis in BC 42:50, Ont 43:57. The causal viruses were reported as cucumber mosaic virus Ont 40:39, potato virus X (solanum virus 1) and potato virus Y (solanum virus 2) NB 40:40, alfalfa mosaic virus (medicago virus 1) Ont 43:57 (*Marmor medicaginis* var. *capsici*) [74], and tobacco mosaic virus Ont 53:64. At Harrow, Ont, AMV, CMV, PVY and tobacco etch virus (first noticed in 50:63) were isolated and identified from plants infected with one or more aphid-borne viruses and TMV was also found, 58:62. TMV causes heavy losses in an occasional field Ont 41:39, but the aphid-spread TEV and CMV cause severe epidemics in years when the population of *Myzus persicae* builds up early in the season Ont 50:63, 51:55, 55:69; [cf. 698].

Excess fertilizer: plants severely stunted, but later recovered Ont 48:49.

Nonparasitic: blossom-end rot, pourriture apicale: BC 22:58, Sask 36:28, Man 23:82, Ont 30:45, Que 49:53, NS 57:66; appreciable losses may occur in dry years.

Nonparasitic: sun scald, insolation: Ont 47:56, NS 44:52.

Caragana Lam.

LEGUMINOSAE

Shrubs or small trees, native to s. Russia and China, grown for ornament or as a windbreak.

1. *C. arborescens* Lam., caragana or Siberian pea-tree, caragana; native to Siberia and Manchuria, widely grown for hedges and shelterbelts on the prairies. 1a, *C. a.* var. *lorbergii* Koehne.
2. *C. microphylla* Lam.; native to Siberia and China.
3. *C. pygmaea* (L.) DC.; native to Siberia and China; plants sold under this name have all belonged to the related species *C. aurantiaca* Koehne., fide R. J. Moore.

Camarosporium caraganae Karst.: on 1 Sask Man [93, p. 132].

Cucurbitaria ?caraganae Karst.: on 1 Man [93, p. 51].

Fusarium solani (Mart.) App. & Wr.: crown rot or wilt, pourridié fusarien: isolations from affected plants suggest that this species is the principal pathogen causing wilt of 1 in Man Sask 34:81, [93, p. 118; 335].

Fusarium spp. associated with: (a) wilted plants of 1, *F. acuminatum* Ell. & Ev., Sask Man; *F. avenaceum* (Fr.) Sacc., *F. oxysporum* Schlecht., *F. o.* var. *redolens* (Wr.) Gordon, Man; and (b) blighted seedlings, *F. acuminatum*, *F. culmorum* (W.G.Sm.) Sacc., *F. equiseti* (Cda.) Sacc., *F. moniliforme* Sheld., *F. oxysporum* var. *redolens*, Sask [335]; also *F. oxysporum* var. *redolens* in Man [335].

Phyllosticta gallarum Thüm.: leaf spot, tache foliaire: on 1 Alaska [175], Que 53:105, 58:104.

Polyporus tulipiferae (Schw.) Overh.: white spongy rot, carie blanche spongieuse: on 1 Man [93, p. 84]; on ?1 Sask 41:88, Que 40:90.

Septoria caraganae (Jacz.) Died.: leaf spot, tache septorienne: on 1 Alta 31:89, Sask Man [93, p. 137], w. Ont 44:99; on 1a, 2 Man 48:98. The pathogen often becomes epidemic and causes premature defoliation with consequent loss of vigor of this valuable shrub, 42:98, 47:100.

Stictis mollis Pers.: on 1 Sask [93, p. 42].

Tubercularia vulgaris Tode: on 1 Man [93, p. 128].

Cardamine L.

CRUCIFERAE

Mostly glabrous perennial herbs of cold and temperate regions.

1. *C. bellidifolia* L., circumpolar; in N. America from Greenl to Alaska s. to Labr, Que and Alta.
2. *C. occidentalis* (S. Wats.) Howell; BC, Wash and Oregon.
3. *C. pratensis* L., including *C. p.* var. *augustifolia* Hook.; in part naturalized from Europe; Greenl to Alaska s. to Labr, Nfld, Que, Mack and BC.

Botrytis cinerea Pers.: on 1 Frank [971].

Chytridiales, gen. incert., probably close to *Physoderma*: on 1 Frank [971].

Cladosporium herbarum Lk.: on 1 Greenl [601].

Heteropatella umbilicata (Pers. ex Fr.) Jaap (*Septoria cercosperma* Rostr.): on 1 Greenl [899].

Mycosphaerella densa (Rostr.) Lind: on 1 Mack [604], Greenl [603], on 3 Frank [52].

M. pyrenaica (Speg.) Arx (stat. conid. ?*Ramularia cardamines* Sacc.; stat. microconid. ?*Phyllosticta cardamines* Allesch.): on 1 Frank [971].

M. tassiana (de Not.) Johans. (*M. pachyasca* (Rostr.) Vesterg., *Sphaerella cruciferarum* auct. non Fr.): on 1, 3 Greenl [899]; on 1 Greenl [601].

M. tassiana var. *tassiana*: on 3 Frank [52].

Peronospora parasitica (Pers. ex Fr.) Fr.: on 1 Frank [604, 959]; on 3 BC [535].

Phoma oleracea Sacc.: on 1 Alaska [175].

Pleospora androsaces Fckl. (*Pyrenophora a.* (Fckl.) Sacc.): on 1 Greenl [603].

P. herbarum (Fr.) Rabh.: on 1 Greenl [902].

P. penicillus (Schm.) Fckl. var. *p.* (*Pyrenophora chrysospora* (Niessl) Sacc.): on 1 Greenl [601, 602].

Puccinia cruciferarum Rud. (*Micropuccinia c.* (Rud.) Rostr. [902, p. 114], *P. cardamines-bellidifoliae* Diet.): III on 1 Alaska BC Frank Que [958], Alaska [175], BC Greenl [15, p. 292], Greenl [601, 603, 901, 902].

P. cruciferarum spp. *borealis* Savile: on 1 Alaska Yukon BC [966, p. 241].

P. cruciferarum spp. *nearctica* Savile & Parmelee: on 1 Frank Greenl [971]; on 1 Frank Greenl, also less typically on 1 Frank Keew Que, on 3 Keew [966, p. 243].

Synchytrium affin. *aureum* Schroet.: on 1 Frank [971].

Cardaria Desv.

CRUCIFERAE

Perennial herbs of the Old World.

1. *C. draba* (L.) Desv. (*Lepidium d. L.*), hoary

Cardaria

cress, cranson dravier; naturalized from Europe and w. Asia; this perennial weed is widely distributed in Canada.

Cercospora bizzoeriana Sacc. & Berl.: on *I* Man [93, p. 114].

Carex L.

CYPERACEAE

Perennial grasslike herbs mostly with triangular culms; of worldwide distribution. The hosts are listed as they occur in the records; where the names differ from modern usage the probable correct name is given in parentheses.

1, *C. abdita* Bickn. 2, *C. acuta* L. or *C. acuta* sensu Mack. (*C. nigra* (L.) Reichard). 3, *C. adelostoma* Kari. 4, *C. aenea* Fern. 5, *C. alpina* (*C. norvegica* Retz.). 6, *C. ampullacea* Good. (*C. rostrata* Stokes). 7, *C. angustior* Mack. 8, *C. aperta* Boott. 9, *C. aquatilis* Wahl. 9a, *C. a.* var. *altior* (Rydb.) Fern. 9b, *C. a.* var. *stans* (Drej.) Boott. 10, *C. arcta* Boott. 11, *C. arctata* Boott. 12, *C. artitecta* Mack. 13, *C. atherodes* Spreng. 14, *C. atrata* L. 15, *C. atratiformis* Britt. 16, *C. atrofusca* Schk. 17, *C. aurea* Nutt. 18, *C. backii* Boott. 19, *C. bebbii* Olney. 20, *C. bicolor* Bellard. 21, *C. bigelowii* Torr. 22, *C. bipartita* Bellard. (*C. lachenalii* Schk.). 22a, *C. b.* var. *amphigena* (Fern.) Polunin (*C. glareosa* Wahl. var. *a.* Fern.). 23, *C. brunnescens* (Pers.) Poir. 24, *C. buxbaumii* Wahl. 25, *C. canescens* L. 26, *C. capillaris* L. 27, *C. capitata* L. 28, *C. chordorrhiza* L.f. 29, *C. circinata* C. A. Mey. 30, *C. compacta* R.Br. (*C. ?membranacea* Hook.). 31, *C. cristatella* Britt. 32, *C. deflexa* Hornem. 33, *C. deweyana* Schw. 34, *C. diandra* Schrank. 35, *C. disperma* Dewey. 36, *C. douglasii* Boott. 37, *C. durifolia* Bailey (*C. backii* Boott). 38, *C. eburnea* Boott. 39, *C. eleocharis* Bailey. 40, *C. enanderi* Hult. 41, *C. exilis* Dewey. 42, *C. festiva* Bailey (*C. festivella* Mack.). 43, *C. festivella* Mack. 44, *C. filifolia* Nutt. 45, *C. × firmior*. 46, *C. flacca* Schreb. 47, *C. flava* L. 48, *C. foena* Willd. 49, *C. fyllae* Holm. 50, *C. garberi* Fern. 51, *C. glacialis* Mack. 52, *C. glareosa* Wahl. 52a, *C. g.* var. *amphigena* Fern. 53, *C. glauca* Scop. (*C. flacca* Schreb.). 54, *C. gmelini* Hook. & Arn. 55, *C. goodenowii* J. Gay (*C. nigra* (L.) Reichard). 56, *C. gynocrates* Wormsk. 57, *C. haematolepis* Drej. (*C. lyngbyei* Hornem.). 58, *C. haydenii* Dewey. 59, *C. hepburnii* Boott (*C. nardina* Fries var. *h.* (Boott) Kükenth.). 60, *C. heliophila* Mack. 61, *C. hindsii* C. B. Clarke. 62, *C. holostoma* Drej. 63, *C. hoodii* Boott. 64, *C. hyperborea* Drej. (*C. bigelowii* Torr.). 65, *C. incurva* Lightf. (*C. maritima* Gunn.). 66, *C. interior* Bailey. 67, *C. intumescens* Rudge. 68, *C. jacobipeteri* Hult. 69, *C. lachenalii* Schk. 70, *C. laeviculmis* Meinsh. 71, *C. lagopina* Wahl. (*C. lachenalii* Schk.). 72, *C. lanuginosa* Michx. 73,

C. lasiocarpa Ehrh. (*C. l.* var. *americana*). 73a, *C. l.* var. *americana* Fern. 74, *C. laxiflora* Lam. 75, *C. leiophylla* Mack. 76, *C. leptalea* Wahl. 77, *C. leptonervia* Fern. 78, *C. limosa* L. 79, *C. livida* (Wahl.) Willd. 80, *C. loliacea* L. 81, *C. lugens* Holm. 82, *C. lupuliformis* Sartw. 83, *C. lupulina* Muhl. 84, *C. lyngbyei* Hornem. 84a, *C. l.* ssp. *cryptocarpa* (C.A.Mey.) Hult. 85, *C. macloviana* d'Urv. spp. *pachystachya* (Cham.) Hult. 86, *C. macrocephala* Willd. 87, *C. macrochaeta* C.A. Mey. 88, *C. magellanica* Lam. 89, *C. marina* Dewey (*C. glareosa* Wahl. var. *amphigena* Fern.). 90, *C. maritima* Gunn. (*C. m.* var. *sentina*). 90a, *C. maritima* var. *sentina* (Christ.) Fern. 91, *C. membranacea* Hook. 92, *C. membranopacta* Bailey (*C. membranacea* Hook.). 93, *C. mertensii* Presc. 94, *C. michauxiana* Boeckl. 95, *C. microglochin* Wahl. 96, *C. miliaris* Michx. 97, *C. misandra* R.Br. 98, *C. montana* Gunn. 99, *C. montanensis* Bailey. 100, *C. muricata* L. 101, *C. nesophila* Holm. 102, *C. nardina* Fries. 102a, *C. n.* var. *atriceps* Kükenth. 102b, *C. n.* var. *hepburnii* (Boott) Kükenth. 103, *C. nigra* (L.) Reichard. 104, *C. nigrifolia* Drej. (*C. stylosa* C.A.Mey.). 105, *C. nigromarginata* Schw. 106, *C. norvegica* Retz. 107, *C. novae-angliae* Schw. 108, *C. obtusata* Lilj. 109, *C. pachystachya* Cham. (*C. macloviana* d'Urv. ssp. *p.* (Cham.) Hult.). 110, *C. paleacea* Wahl. 111, *C. parallela* (Laest.) Sommerf. 112, *C. pauciflora* Lightf. 113, *C. paupercula* Michx. 114, *C. peckii* Howe. 115, *C. pedata* Wahl. (*C. glacialis* Mack.). 116, *C. pedunculata* Muhl. 117, *C. pensylvanica* Lam. 117a, *C. p.* var. *distans* Pk. 118, *C. petricosa* Dewey. 119, *C. physocarpa* Presl. 120, *C. pillulifera* L. 121, *C. pluriflora* Hult. 122, *C. podocarpa* R.Br. 123, *C. praegracilis* W.Boott. 124, *C. pratensis* Drej. non Host (*C. praticola*). 125, *C. praticola* Rydb. 126, *C. projecta* Mack. 127, *C. pulla* Good. 128, *C. pyrenaica* Wahl. 128a, *C. p.* var. *micropoda* (C.A.Mey.) Hult. 129, *C. rariflora* (Wahl.) Sm. 130, *C. retrorsa* Schw. 131, *C. rhynchophysa* C.A.Mey. 132, *C. rigida* Good. 133, *C. rossii* Boott. 134, *C. rostrata* Stokes. 135, *C. rotundata* Wahl. 136, *C. rufina* Drej. 137, *C. rupestris* Bellard. 138, *C. salina* Wahl. 138a, *C. s.* var. *kattgatensis* (Fries) Alm. 138b, *C. s.* var. *subspathacea* (Wormsk.) Tuckerm. 139, *C. saxatilis* L. 139a, *C. s.* var. *laxa* (Trautv.) Ohwi. 140, *C. scirpoidea* Michx. 141, *C. scoparia* Schk. 142, *C. siccata* Dewey (*C. foena* Willd.). 143, *C. sitchensis* Presc. 144, *C. spectabilis* Dewey. 145, *C. spicata* Huds. 146, *C. stans* Drej. (*C. aquatilis* Wahl. var. *s.* (Drej.) Boott). 147, *C. stellulata* Good. 148, *C. stricta* Lam. 149, *C. stylosa* C.A. Mey. 150, *C. substricta* (Kükenth.) Mack. (*C. aquatilis* Wahl. var. *altior* (Rydb.) Fern.). 151, *C. supina* Wahl. 152, *C. tenuiflora* Wahl. 153, *C. tetanica* Schk. 154, *C. tribuloides* Wahl. 154a, *C. t.* var. *reducta* Bailey (*C. projecta* Mack.).

155, *C. trisperma* Dewey. 156, *C. turfosa* Fries (*C. nigra* (L.) Reichard). 157, *C. umbellata* Schk. 158, *C. ursina* Dewey. 159, *C. ustulata* Wahl. (*C. atrofusca* Schk.). 160, *C. vaginata* Tausch. 161, *C. varia* Muhl. 162, *C. vesicaria* L. 162a, *C. v.* var. *monile* (Tuckerm.) Fern. 163, *C. vitilis* Fries (*C. brunnescens* (Pers.) Poir.). 164, *C. vulgaris* Fries (*C. ?nigra* (L.) Reichard). 165, *C. warmingii* Holm (*C. bigelowii* Torr.).

Anthracoidea Bref. (see also (*Cintractia*): Kukkonen [572] has shown that the smuts on *Carex* formerly referred to the genus *Cintractia* Cornu must be placed in *Anthracoidea*. Some of Kukkonen's findings are reported here separately from those of Savile [952] under *Cintractia*, because Kukkonen has recognized new species in the complex and altered the limits of others. A part of the Canadian collections that belong to species under his section *Echinisporae* were only published later [574], after this summary was completed.

A. atratae (Savile) Kukkonen: on 87 Alaska BC, 99 BC Yukon, 101 Alaska, 122 Alaska BC Yukon, 144 BC [572, p. 80].

A. affin. atratae: on 9b Frank [971].

A. buxbaumii Kukkonen: on 3 Que, 24 Alaska BC Alta Que Nfld [572, p. 88].

A. capillaris Kukkonen: on 26 BC Yukon Mack Man Que Labr Nfld [572, p. 50].

A. caricis (Pers.) Bref.: on 1 Sask NS, 32 Mack Que Greenl, 60 BC Mack Sask ?Man, 115 Alta, 116 ?Man Ont Que, 133 Alaska BC, 157 Que [572].

A. caricis-pauciflorae (Lehtola) Kukkonen: on 112 BC [572, p. 74].

A. caryophyllae Kukkonen: on 15 Alaska Mack Que, 108 Yukon [572, p. 53].

A. eleocharidis Kukkonen: on 39 Yukon, type [573, p. 274]. The taxonomic separation of *Anthracoidea* from *Cintractia* is fully discussed.

A. elynae (Syd.) Kukkonen var. *nardinae* Kukkonen: on 102 BC Keew Frank Que Greenl [572, p. 66], Frank [971].

A. lasiocarpae Lindeberg in Kukkonen: on 73 Alaska [572, p. 85].

A. limosa (Syd.) Kukkonen: on 78 Alaska BC Yukon Mack Sask Man Ont Que NB PEI Labr Nfld, 78 × 129 Man Que Nfld, 88 Alaska Mack Que Labr, 121 Alaska BC, 129 Alaska Keew Man Ont Que Labr Nfld [572, p. 91].

A. misandrae Kukkonen: on 16 Keew Greenl, 97 BC Keew Frank, 118 BC [572, p. 82].

A. paniceae Kukkonen: on 17 Mack Alta Que, 79 Alaska BC Que Nfld, 160 Yukon Mack Alta Sask Man Que Nfld [572, p. 76].

A. rupestris Kukkonen: on 51 Frank Ont Que Greenl, 137 BC Mack Man Keew Frank Que Nfld Greenl [572, p. 47]; in Frank and widespread in low arctic and subarctic regions [971].

A. scirpoideae Kukkonen: on 140 Alaska BC Alta Yukon Mack Keew Frank Man Que Nfld [572, p. 78].

Arthrimum naviculare Rostr.: on 115 Frank [604].

A. puccinioides (DC.) Kze. (*Goniosporium p.* (DC.) Lk.): on 24, 124 Greenl [900]; on 42 Greenl [901].

Ascochyta sodalis Grove: on *C. sp.* Alaska [175].

A. teretiuscula Sacc. & Roum.: on ?161 Man [93, p. 132].

Belonioscypha melanospora Rehm: on 97 Frank [604].

Camptoum curvatum (Kze. & Schm.) Lk.: on 52 Greenl [899].

Cintractia Cornu: smut, charbon: The following species have been recorded by Savile [952] in northern N. America:

C. aspera Liro [*Anthracoidea a.* (Liro) Kukkonen, 572, p. 73]: on 28 Alaska Alta Que.

C. atratae Savile [952, p. 423]: on 122 Yukon: see *Anthracoidea a.*

C. calderi Savile [951, p. 324] [*Anthracoidea c.* (Savile) Kukkonen, 572, p. 73]: on 18 Man Ont.

C. caricis (Pers.) Magn. var. *acutarum* Savile [952, p. 425]: on 9 Alaska Yukon BC Mack Alta Sask Man Keew Ont Nfld, 33 Ont, 58 Que, 79 Alaska Que Nfld, 110 Que, 138 Labr Nfld, 138a Que, 143 BC, 151 Sask.

C. caricis var. *caricis*: on 2 Ont, 17 Que, 26 Keew Que Nfld, 79 Alaska, 117 Man Que, 117a Que, 137 Keew Frank Greenl Man Que Nfld, 151, 153 Que.

C. caricis var. *intermedia* Savile [952, p. 424]: on 1 NS, 26 Man, 32 Mack Greenl, 51 Que, 54, 84a Alaska, 106 Que, 108 Yukon, 151 Mack, 117 Sask Man Ont.

C. carpophila (Schum.) Liro var. *carpophila*: on 4 Que, 7 Que Nfld, 13 Sask, 23 Alaska Ont Que Nfld, 25 Alaska, 56 Alaska Yukon Mack Sask Man Ont Que, 66, 72 Que, 77 Nfld, 80 Alaska, 81 Yukon, 89, 102 Keew, 125 Yukon, 133 Alaska BC, 138a Que, 148, 156 Ont, 152 × 256 Alaska.

C. carpophila var. *elynae* (Syd.) Savile [952, p. 419] (*C. elynae* Syd.): on 69 Alaska Yukon, 89 Keew, 123 Sask, [cf. 571].

C. carpophila var. *kenaica* Savile [952, p. 420]: on 33, 128a Alaska.

C. carpophila var. *verrucosa* Savile [952, p. 420]: on 85 Alaska.

C. externa (Griff.) Clint. (*Anthracoidea e.* (Griff.) Kukkonen): on 44 Sask; also in Sask [93, p. 60], Sask Man [572, p. 73].

C. fischeri (Karst.) Liro [*Anthracoidea f.* (Karst.) Kukkonen, 572, p. 73]: on 25 Alaska BC, 28 BC, Que, 73 Ont, 131 Yukon, 134 Alaska BC Alta Ont Que, 162 Ont.

C. limosa Syd. var. *gigantissima* (Lehtola) Savile [952, p. 426]: on 45 Nfld, 78 Alaska Man Nfld, 99 Yukon 113, 121 Alaska, 129 Ont Que Nfld.

C. limosa var. *limosa* (see *Anthracoidea*): on 21 Que, 24 Alaska Que, 56 Que, 73a Alaska, 78 Alta Sask Man Ont Que Labr Nfld, 138 Labr, 138b Keew, 140 Yukon Alta Man Nfld, 160 Yukon Mack Alta Man Que Nfld [952].

C. limosa var. *minor* Savile [952, p. 426]: on 16 Keew Greenl, 21 Mack Que, 48 Mack Alta, 81 Yukon, 97 Keew, 113 Que, 140 Alaska Alta Que Nfld.

C. pratensis Syd.: on 41 Que, on 62 Keew.

C. subinclusa (Koern.) Magn. [*Anthracoidea s.* (Koern.) Bref.]: on 13 Sask, 96 Que Nfld, 119 Alaska, 130 Ont, 139 Man, 162 Ont; also on 94 NB [1138]. Apparently sustained wet weather during anthesis of the hosts favors infection [952]; as a result of these studies new light was shed on the phylogeny of the host genus *Carex* [967].

C. caricis (Pers.) Magn., sensu lat. (*Ustilago c.* (Pers.) Fekl.): on *C. sp.* Greenl [901]; on *C. spp.* Sask [93, p. 60]; on *C. sp.* Mack, 9 Man, 21 Mack Frank, 22 Frank Que Labr, 22a Frank, 51 Mack Frank, 56 Man, 67, 102 Frank, 119 Mack, 137 Frank Labr, 140 Mack [605]; on *C. sp.*, 102, 132 Greenl [902]; on 2 NS [1138]; on 52, 64, 102, 132, 137, 140, 156 Greenl [899].

Cladosporium caricicola Cda.: on 53 Greenl [899].

C. graminum Cda.: on 128, 137, 140 Greenl [899].

- Clasterosporium caricinum* Schw.: on *C. sp.* [277]; on 9 Alaska Yukon Mack, arctic and temperate Canada, 9b Frank [971].
- Clathrospora elynae* Rabh. (*Pleospora e.* (Rabh.) Ces. & de Not.): on 15 BC [50]; on 137 Frank, 140 Man [604]; on 102, 151 Greenl [899].
- C. heterospora* (de Not.) Wehm. (*Pleospora h.* de Not.): on 151 Greenl [899].
- C. heterospora* var. *simmonsii* (Wehm.) Wehm. (*C. simmonsii* Wehm.): on *C. sp.* Labr, 140, 151 Frank [52].
- Claviceps grohii* Groves: on ovaries of 7, 23, ?100, 140 Que, 147 BC [369, p. 608]; on ?42, 147 BC [50].
- Cryptosporium nebulosum* Ell. & Ev.: on *C. sp.* Man [93, p. 129].
- Didymella glacialis* Rehm: on *C. sp.* Que [53].
- Diplodia simmonsii* Rostr.: on 102 Greenl [601].
- Entyloma caricinum* Rostr.: on 132 Greenl [899, p. 532].
- Fusarium acuminatum* Ell. & Ev.: on 29 Alaska [1038].
- F. nivale* (Fr.) Ces.: on living leaves of 87 Alaska [1036, 1038].
- Guignardia graminis* (Lind) Barr (*Ascospora g.* Lind): on 26 Frank [52].
- Hendersonia arundinacea* (Desm.) Sacc.: on 26 Greenl [603].
- H. gigantea* Lind: on 127 Greenl [601, p. 161].
- H. rostrupii* Lind: on 92 Keew [604].
- H. stefansonii* Rostr.: on 137 Frank [600].
- Hyalodothis caricis* Pat. & Har.: on 24, 40, 78, 84, 112 Alaska [175]; on 79 BC [1199].
- Hysteropezizella diminuens* (Karst.) Nannf.: on 25 Alaska [175].
- H. ignobilis* (Karst.) Lind (*Naevia i.* (Karst.) Rehm, *Trochila i.* Karst.): on *C. sp.*, 52 Greenl [902]; on 6, 49, 57, 64, 95, 120, 132, 136, 156, 165 Greenl [899]; on 9 Alaska [175]; on 26, 127, 129 Keew, 71 Greenl [604]; on 64 Greenl [901]; on 146 Frank [600]; on 162, 164 Greenl [900].
- H. rigidae* Nannf.: on 132 Alaska [175], Keew [604].
- Leptosphaeria sp.*: on 17 Alaska [1036]; on 61 Alaska [1036, 1038].
- L. caricinella* Karst.: on *C. sp.* Que, 129, 138, 139a Frank [52]; on 17 Alaska [1038]; on 30 Keew, 132 Frank [604]; on 102b Greenl [602]; on 127 Greenl [601]. Lind reduces *L. junciseda* Karst. and *L. vagans* Karst. to synonymy.
- L. epicarecta* (Cke.) Sacc.: on 97 Greenl [601]; on 127 Greenl [899]; on 139 Greenl [902]; on 146 Frank [903].
- L. eustoma* (Fckl.) Sacc. (*Phaeosphaeria e.* (Fckl.) Holm): on *C. sp.* Que [52, 53].
- L. ?folliculata* Ell. & Ev.: on 143 Alaska [175].
- L. herpotrichoides* de Not. (*Phaeosphaeria h.* (de Not.) Holm, *L. culmifraga* (Fr.) Ces. & de Not.): on *C. spp.* BC [50]; on *C. sp.* Que [53]; on *C. sp.* Labr, 26 Frank [52]; on 102b Greenl [602].
- L. insignis* Karst.: on *C. sp.* Frank [52].
- L. microscopica* Karst.: on 92 Frank, 102 Greenl [604].
- L. petkovicensis* Bub. & Ransj.: on *C. spp.* BC [50].
- L. typharum* (Desm.) Karst., sensu Berl.: on *C. sp.* BC [50].
- L. vagans* Karst.: on 15 BC [50]; on 97 Greenl [602].
- Leptostroma caricinum* Fr.: on 25, 129, 132 Greenl [899].
- Lophodermium caricinum* (Desm.) Duby: on *C. sp.* Greenl [901]; on 55 Alaska [604]; on 57, 64, 95, 104, 127 Greenl [899]; on 162 Greenl [900].
- Metasphaeria cumana* (Sacc. & Speg.) Sacc.: on dead *C. sp.* Man [93, p. 54].
- Mollisia cinerea* (Batsch) Karst.: on 64 Greenl [899]; on 132 Greenl [900].
- M. cymbispora* Rostr. [*Beloniella c.* (Rostr.) Lind]: on 127 Greenl [899].
- Mycosphaerella caricicola* (Fckl.) Lindau: on 52 Greenl [603]; on 128 BC [50].
- M. lineolata* (Rob.) Schroet.: on *C. sp.* Que [53]; on *C. spp.* Labr, 91, 102a, 137, 140 Frank [52]; on 78 BC [50]; on 132 Keew [604].
- M. perexigua* (Karst.) Johans.: on 34 BC [50].
- M. pusilla* (Auersw.) Johans. (*Sphaerella p.* Auersw.): on 5, 132, 140, 157, 158 Greenl [899]; on 11 Greenl [901]; on 47 BC [50]; on 92 Keew Frank [604]; Greenl [903]; on 137 Greenl [902].
- M. recutita* (Fr.) Johans.: on *C. sp.* Alaska [175]; on *C. sp.* Labr., *C. spp.* Que, 146 Frank [52].
- M. tassiana* (de Not.) Johans. (*Sphaerella t.* de Not.): on *C. spp.* BC [50]; on 9 Mack Keew Frank, 65 Frank [604]; on 20, 62, 64, 71, 97, 137, 146 Greenl [899]; on 42, 65 Greenl [901]; on 65, 97, 138b Frank [587]; on 65, 97, 127, 132 Greenl [601]; on 65, 92, 115, 146, 159 Greenl [903]; on 65 Greenl [603]; on 91, 102b Greenl [602]; on 129, 132 Greenl [902].
- M. tassiana* var. *arctica* (Rostr.) Barr: on 92a, 97 Frank [52].
- M. tassiana* var. *arthopyrenioides* (Auersw.) Barr: on 102a Frank [52].
- M. tassiana* var. *tassiana*: on *C. sp.* Que, 16 Frank [52]; on *C. sp.* Que [53].
- M. wichuriana* (Schroet.) Johans. (*Sphaerella w.* Schroet.): on *C. spp.* BC [50]; on 64, 102, 124, 137, 146 Greenl [899]; on 92, 97, 137, 138b Frank [600]; on 102 Greenl [601]; on 159 Keew [604].
- Peniophora sambuci* (Pers.) Burt: probably this species on *C. sp.* Man [93, p. 78].
- Phaeoseptoria caricicola* (Sacc.) Sprague: on 125 Alaska [1036, 1038].
- Phoma caricis* (Fr.) Sacc.: on 15, 64 Greenl [899]; on 92 Frank [903].
- Phomatospora therophila* (Desm.) Sacc.: on *C. sp.* Que [53].
- Phyllachora caricis* (Fr.) Sacc.: on 106 Keew [604].
- Phyllosticta caricicola* Sacc. & Scalia: on *C. sp.* Alaska [175].
- P. caricis* (Fckl.) Sacc.: on ?162 Man [93, p. 135].
- Physalospora alpestris* Niessl: on 111 Greenl [901].
- Planetella lironis* Savile: on 75 Yukon, 90 Keew [951, p. 327].
- Platyspora pentamera* (Karst.) Wehm. (*Clathrospora p.* (Karst.) Berl., *Pleospora p.* Karst.): on *C. sp.*, 90a, 97, 139a Frank [52]; on 8 BC [50]; on 9a Alaska [175, 604]; on 52, 137, 146 Greenl [899]; on 59, 97 Frank [604]; on 65, 102 Greenl [603]; on 102, 146 Frank [903]; on 102a Greenl [602].
- P. planispora* (Ell.) Wehm. (*Clathrospora p.* (Ell.) Berl.): on 97 Greenl [602].
- Pleospora ambigua* (Berl. & Bres.) Wehm.: on *C. sp.* Que [52].
- P. dura* Niessl: on 65 Mack [604].
- P. heleocharidis* Karst.: on *C. sp.* Labr [52].
- P. heleocharidis* var. *arctica* (Karst.) Wehm. (*P. a.* Karst.): on *C. sp.* Labr [52].
- P. herbarum* (Fr.) Rabh. var. *herbarum* (*P. discors* (Dur. & Mont.) Ces. & de Not.): on 63 BC [50]; on 65 Mack, 159 Man [604]; on 97 Greenl [603]; on 102 Greenl [602]; on 131 Greenl [902].

Pleospora phaeocomoides (Berk. & Br.) Wint. var. *infectoria* (Fckl.) Wehm. (*P. i.* Fckl.): on 97 Greenl [602].

P. togwotiensis Wehm.: on 102a Frank [52].

Puccinia atrofusca (Dudl. & Thomp.) Holw.: II III on 36 Alta Man, 39 Yukon, 44 Alta Sask, 123 Man, 133 BC [144; cf. 15, p. 206; 93, p. 66].

P. bolleyana Sacc.: II III on 67 NS, 82 Ont [15, p. 204]; on 83 Ont [828].

P. caricina DC. (*P. caricis* (Schum.) Schroet.): II III on some 45 species of *Carex*: Alaska 11, BC 4, Alta 1, Man 1, Ont 25, Que 7, NB 1, NS 8, PEI 1, Nfld 1 [15, p. 207; 93, p. 66; 175; 13; 828; 1038; 1036; 1138]. Arthur [15] recognized several varieties and to judge from the records of 0 I on *Ribes* and *Urtica*, *P. caricis* var. *grossulariata* Arth. and *P. c.* var. *uniporula* (Orton) Arth. are more common than *P. c.* var. *urticata* (Kern) Arth.

P. caricina var. *limosae* (Magn.) Jørstad (*P. karelica* Tranz., *P. limosae* Magn.): II III on 10, 78 Ont; on 15 Que [15, p. 212]; on 113 Ont Que [828], Que [8], NS [15, p. 214; 1138]; on 162 Ont [828].

P. caricis-shepherdiae Davis: II III on *C. sp.* Alaska [175]; on 9, 13, 72 Sask, 38 Ont Que [15, p. 211]; on 21 Que [828]; on 150 Mack, 162 Sask [93, p. 67].

P. dioicae Magn. (*P. extensicola* Plowr.): II III on some 26 species of *Carex*, BC to NS [15, p. 197; 93, p. 68; 828; 1138]. Arthur [15] recognized several varieties.

P. microsora Koern. ex Fckl.: 0 I unknown; II¹ II² III on 130, 162, 162a Ont [828; cf. 15, p. 213].

P. minutissima Arth.: II III on 73, 150 Ont [15, p. 203]; on 76 Ont [828].

Rhabdospora groenlandica Lind (*Septoria nebulosa* Rostr.): on 102, 127, 137 Greenl [601, p. 159]; this fungus is not distinct from *Selenophoma drabae* (q.v.).

Rutstroemia paludosa (Cash & Davidson) Groves & M.E.Elliott: on old leaves of *C. sp.* Que [378].

Schizonella melanogramma (DC.) Schroet.: on 9 Yukon, 60 Sask, 74, 116, 117 Ont Que, 137, 140 Que, 153 Ont, [292]; on 137 Que [605]; on 146 Yukon [250].

Sclerotinia arctica M.E.Elliott: on 9b Frank, type [276, p. 1068; cf. sub *S. affin. vahliana* Rostr. 971].

Selenophoma drabae (Fckl.) Petr. (*Rhabdospora d.* (Fckl.) Berl. & Vogl.): on 9, 65, 102, 137 Greenl [603]; on 29, 68 Alaska [1036]; on 97, 102b Greenl [602]; on 102b Frank [604].

Septoria caricinella Sacc.: on 102 Greenl [901]; on 145 Ont 34:98.

S. caricis Pass.: on ?162 Man [93, p. 137].

S. nematospora Davis: on 35, 50, 70, 125 Alaska [1036; cf. 1038]; on 86 Alaska [175].

S. nematospora f. *aggregata* Sprague: on dry leaves of 125 Alaska [1036, p. 165; 1038].

S. punctoidea Karst.: on 26, 115, 151 Greenl [901]; on 26, 64, 97, 115, 137 Greenl [899].

Sphaerella leptospora Sacc. & Scalia: on 93 Alaska [175].

Stagonospora albescens Davis: on ?162 Man [93, p. 140].

S. caricis (Oud.) Sacc.: on 97, 102 Frank [903]; on 146 Keew [604].

S. gigaspora (Niessl) Sacc.: on 92 Frank, 127 Man [604].

S. heleocharidis Trail var. *caricina* Sacc. & Scalia: on 109 Alaska [175].

S. simplicior Sacc. & Berl.: on 70 Alaska [1036].

S. strictae Ell. & Ev.: on 106 Alaska [175], Keew [604].

S. subseriata (Desm.) Sacc.: on *C. spp.*, 93, 144 Alaska [1036].

Thecaphora apicis Savile: on 128 Apex Mt., BC [953, p. 664].

T. aterrima Tul.: on 44 Yukon Sask [953], Alaska Sask [292].

Trochila diminuens Karst. [*Hysteropezizella d.*, q.v.]: on 5, 14, 25, 27, 42, 71, 135, 163 Greenl [899].

T. fuscella Karst. (*Naevia f.* (Karst.) Lind): on 64, 140, 146, 164 Greenl [899]; on 146 Frank [600].

Urocystis fischeri Koern.: on 13 Alta Man [292], Man [93, p. 61].

Uromyces perigynius Halst.: II III on 19, 31, 154 Ont [828]; on *C. sp.*, 141 PEI, 32, 47, 67, 105, 107, 117, 141, 154, 154a, 161 NS [1138; cf. 15, p. 200].

Ustilago arctica (Rostr.) B.Lindeberg (*Tilletia a.* Rostr., *Cintractia a.* (Rostr.) Lagerh.): on *C. sp.* Greenl [902]; on 90 Frank [971; cf. 952].

Wettsteinina macrotheca (Rostr.) Barr (*Massaria m.* Rostr.) Lind, *Metasphaeria m.* Rostr.): on *C. sp.* BC [50]; on *C. spp.* Greenl [604], Que [52]; on 64, 132 Greenl [899, p. 561].

W. niesslii Müll. (*Leptosphaeria gigaspora* Niessl): on *C. sp.* Que [53]; on 95 Greenl [899]; on 120 Greenl [601].

Carpinus L.

CORYLACEAE

Trees or tall shrubs of the northern hemisphere.

1. *C. caroliniana* Walt. (*C. americana* Michx.), hornbeam, charme; represented in Canada by 1a, *C. c.* var. *virginiana* (Marsh.) Fern., blue beech, charme; in Canada in s. Ont and s. Que; wood used locally because it is hard and tough. Probably the fungi recorded below were all collected on 1a although rarely so recorded.

Conoplea globosa (Schw.) Hughes (*Streptothrix g.* (Schw.) Hughes): on 1 Ont [484]; on 1a Ont, and other broad-leaved trees; pure cultures of *Urnula craterium* (Schw.) Fr. yielded this imperfect, confirming the work of R.W.Davidson [479, p. 606, 659].

C. sphaerica (Pers.) Pers.: on *C. sp.* Ont Que [484].

Cylindrosporium dearnessii Ell. & Ev.: leaf spot, tache des feuilles: on 1 ?Ont 33:90.

Fomes igniarius (L. ex Fr.) Kickx.: white trunk rot, carie blanche du tronc: sporophores on 1 Ont F55:59.

Ganoderma applanatum (Pers. ex Wallr.) Pat. (*Fomes applanatus* (Pers. ex Wallr.) Gill.: on 1 ?Ont 33:90; on ?1 NS [1138].

Gloeosporium carpinicola Ell. & Dearn.: leaf spot, tache des feuilles: on 1 Ont 25:62; von Arx [15a, p. 68] found that the type specimen is *Taphrina australis* (Atk.) Giesenh.

G. robergei Desm. ([*Monostichella robergei* (Desm.) Höhn.] perfect state *Sphaerognomonia carpinica* (Fr.) Poteb.): leaf spot, tache des feuilles: on 1 Ont 25:62.

Melanconis chrysostoma (Fr.) Tul. var. *carpinigera* (Berk.) Wehm. nom. nud.: on 1a Ont F60:66; but see below.

M. chrysostoma var. *ellisii* (Rehm) Wehm.: on 1a Ont F60:66.

Carpinus

- Peniophora heterocystidia* Burt: on 1 Ont [705]; see *Acer*.
Pezicula carpinea (Pers.) Tul.: on 1 Ont [365].
Pleomassaria carpini Fckl.: on 1a Ont F63:70.
Rutstroemia bolaris (Batsch ex Fr.) Rehm: on 1a Ont F60:66.
Taphrina australis (Atk.) Giesenh.: on 1 Ont, Ell. & Ev., F. columb. 1263, sub *Gloeosporium carpinicola*, q.v.

Carthamus L.

COMPOSITAE

Herbaceous annuals native to the Canary Islands eastward to central Asia; one once cult. for the dye extracted from the flowers and still cult. for the oil in the seed.

1. *C. tinctorius* L., safflower or false saffron, safran bâtard; native to Eurasia.

Alternaria carthami Chowdhury: leaf spot, tache alternarienne: on 1 Alta 56:38, Ont 54:44; the fungus was isolated from the Ont material and the spore dimensions found to agree with the original description.

A. tenuis auct. sensu Wiltshire: associated with a leaf spot of 1 Man 53:42; from seed of 1 Ont [374].

Botrytis cinerea Pers.: gray mold, moisissure grise: on heads of 1 Sask 51:32, Ont 54:44; cause of a seedling blight Ont 43:28; from seed Alta [913].

Chaetomium globosum Kunze: from seed of 1 Ont [1009].

Colletotrichum gloeosporioides Penz. (*Gloeosporium carthami* (Fukui) Hori & Hemmi): anthracnose, anthracnose: from a seedling of 1 Ont 55:43.

Fusarium spp.: associated with root rot of 1 Alta 45:38, 55:40; cf. *Pythium*.

Fusarium spp.: *F. acuminatum* Ell. & Ev. from seed of 1 Alta [334]; this species and *F. solani* (Mart.) App. & Wr. from affected plants Man [335].

Macrosporium carthami Rodighin: on 1 Man 43:28, but this report is unconfirmed.

Puccinia carthami Cda.: rust, rouille: 0 II III or more correctly 0 II¹ II² III [1208] on 1 Alta 43:28, Sask Man Ont 42:28; one rust that is capable of spreading to new areas from spores carried on the seed, 43:28, 54:44; a potentially destructive disease of safflowers growing in concentrated areas Man 53:41; cultivars differ widely in susceptibility, 50:39, 51:32; some evidence of physiologic specialization was observed, 55:44; seed treatment was effective against seed-borne, but not soil-borne inoculum (J.S.Horricks in litt.) [cf. 15, p. 349; 198].

Pythium sp. inedit.: root rot or wilt, pourriture des racines ou flétrissure: on 1 grown under irrigation Alta 49:31, 50:39; cultivars differed greatly in susceptibility, 51:32.

P. debaryanum Hesse and *Fusarium* sp.: cause of severe damping-off of 1 Sask 56:38.

Sclerotinia sclerotiorum (Lib.) de Bary: head rot, pourriture sclérotique: on 1 Alta 52:34, Sask 51:32, Man 53:41; from seed Alta [913].

Carum L.

UMBELLIFERAE

Erect biennial herbs of the northern hemisphere; one cult. for its fruits, which are used in flavoring.

1. *C. carvi* L., caraway, anis; naturalized from Europe in Nfld, NS to Alta.

Sclerotinia sclerotiorum (Lib.) de Bary: sclerotia found in a threshed sample of seed of 1 Que 45:50.

Aster yellows virus (callistephus virus 1): aster yellows, jaunisse de l'aster: BC 47:44, NB 48:39.

Carya Nutt.

JUGLANDACEAE

Fine timber trees of e. N. America and e. Asia; the three most common species in Canada are:

1. *C. cordiformis* (Wang.) K.Koch, bitternut hickory, noyer amer; the most abundant hickory in Canada, occurring throughout s. Ont. and s.w. Que; wood used in tool handles and sporting goods.
2. *C. glabra* (Mill.) Sweet, pignut, noyer à cochons; in Canada only along Lake Erie and in the Niagara Peninsula in Ont; wood used as above.
3. *C. ovata* (Mill.) K.Koch, shagbark hickory, arbre à noix douces ou noyer tendre; in Canada in s. Ont and s.w. Que; wood used as vehicle stock, etc.; the tree produces the hickory nut of commerce.

Armillaria mellea (Vahl ex Fr.) Kummer: on *C. sp.* Ont F54:76; sporophores collected on 3 Ont F55:59.

Conoplea sphaerica (Pers.) Pers.: on *C. sp.* Que [484].

Eutypa milliaria (Fr.) Sacc.: on *C. sp.* Ont 34:98.

Gloeosporium caryae Ell. & Dearn. ([*Cylindrosporella c.* (Pk.) Petr.]; perfect state *Gnomonia caryae* Wolf): anthracnose, anthracnose: on leaves of *C. sp.* Ont 25:64; on 1, 2 ?Ont 33:87.

Microstroma juglandis (Bereng.) Sacc.: leaf spot, moisissure blanche: on *C. sp.* Ont 25:64, 52:103; on 3 Ont 33:86, F60:66.

Schizophyllum commune Fr.: white spongy rot, carie blanche spongieuse: on 1 Que 39:97.

Cassiope D.Don.

ERICACEAE

Small arctic or alpine evergreen plants of the northern hemisphere, suited for the alpine rockery.

1. *C. hypnoides* (L.) D. Don.; arctic regions; in Canada s. to Nfld and Que.
2. *C. lycopodioides* (Pall.) D. Don.; Alaska, n.e. Asia and Japan.
3. *C. mertensiana* (Bong.) G. Don.; Alaska to Alta and south in the mountains.
4. *C. stelleriana* (Pall.) DC., from e. Asia and Alaska south to Wash.
5. *C. tetragona* (L.) D. Don.; in e. Asia and across arctic N. America.

Antennaria rectangularis Sacc. (?*Antennularia* sp.): on *C. sp.* Alaska [175]; an invalid name as applied to a fungus [3].

Ascochyta cassandrae Pk.: on 1 Greenl [901].

Cainiella borealis Barr: on 5 Frank Mack [52, p. 65].

Cenangium cassiopes Rostr.: on 5 Frank [903, p. 9].

Coryneum cassiopes Rostr.: on 5 Greenl [902].

Exobasidium dendroides Ell. & Ev., inedit.: on 5 Alaska [175]; probably *E. vaccinii* var. *vaccinii*.

E. vaccinii Woron.: on 3 Alaska [175], BC [535]; on 5 Alaska [1038], Frank [962], Greenl [899, 901, 902].

E. vaccinii var. *arctostaphyli* (Harkn.) Savile: on 5 BC [958].

E. vaccinii var. *myrtilli* (Fckl.) Juel: on 5 Mack Frank [605; cf. *E. vaccinii* var. *vaccinii*].

E. vaccinii var. *vaccinii*: on 5 Frank [958, 959, 971].

E. affin. vaccinii: on 3 BC [958].

Gnomoniella hyperarctica (Lind) Barr (*Gnomonia h. Lind*): on 5 Labr [52], Greenl [603, p. 176].

Herpotrichiella polyspora Barr: on dead leaves of 5 and on fruit bodies of *Leptosphaeria hyperborea* and *Wettsteinina andromedae* Labr [52, p. 29].

Inocybe scabella (Fr.) Quél.: (*Astrosporina s. (Fr.) Schroet.*): on 5 Greenl [901].

Leptosphaeria hyperborea (Fckl.) Berl. & Vogl.: on 5 Frank Labr [52].

L. subconica (Cke. & Pk.) Sacc.: on some Ericaceae, Yukon [600].

Lophodermium gracile (Ehr.) Sacc. and *L. orbiculare* (Ehr.) Sacc.: on 2 Alaska [175].

Metasphaeria cassiopes Rostr.: on 5 Keew [604], Greenl [602, 603, 899, p. 561].

Mycosphaerella cassiopes Barr (*M. inconspicua* (Schroet.) Vestergr., *Sphaerella i. Schroet.*, non (Desm.) Ces. & de Not.): on 5 Mack [250], Keew Frank [604], Frank [52], Greenl [603, 899, 902].

M. minor (Karst.) Johans: on 1 Que, 5 Frank Labr [52].

M. punctiformis (Pers. ex Fr.) Starb.: on 2 Alaska [175].

M. tassiana (de Not.) Johans. (*M. pachyasca* (Rostr.) Vestergr.): on 5 Yukon [600].

Paradidymella hyperborea (Karst.) Petrak (*Didymella h. (Karst.) Sacc.*, *Mycosphaerella immersa* Dearn.): on 5 Alaska [175; 250, p. 7C], Frank [52, 604], Greenl [603, 899].

Physalospora hyperborea Bäuml.: on 5 Frank [52].

Sclerotinia cassiopes Rostr.: on 5 Greenl [901, p. 56].

Trochila craterium Fr.: on 5 Alaska [175].

Venturia myrtilli Cke.: on 4 BC [50].

Wettsteinina andromedae (Auersw.) Barr (*Leptosphaeria a. (Auersw.) Sacc.*): on *C. sp.* BC [50]; on 5 Frank Labr [52, 604], Greenl [601, 603, 899, 901].

Castanea Mill.

FAGACEAE

Deciduous trees or shrubs native to the temperate regions of the northern hemisphere.

1. *C. dentata* (Marsh.) Borkh., chestnut, châtaigner. A large tree formerly valuable for its timber and nuts but now nearly exterminated throughout its range by endothia blight; found naturally in Canada only in s. Ont.
2. *C. sativa* Mill. (*C. vesca* Gaertn.), Spanish chestnut, châtaigner d'Europe; native to s. Europe, w. Asia and N. Africa and long cult.

Cryptospora cinctula (Cke. & Pk.) Sacc.: on *C. sp.* Ont F60:66.

Endothia parasitica (Murr.) P.J. & H.W. Anderson: blight, brûlure du châtaigner: on 1 Ont 23:110, 32:82, F54:77, ?Que 25:63; on 2 BC [50].

Marssonina ochroleuca (Berk. & Curt. ex Pk.) Lentz (*Septogloeum ochroleucum* (Berk. & Curt. ex Pk.) Dearn.): on 1 Ont 25:63.

Rutstroemia americana (Durand) W.L. White (*Ciboria a. Durand*): on 2 Ont [979].

Castilleja Mutis

SCROPHULARIACEAE

Herbs, somewhat parasitic on roots of other plants, native to N. America and n.e. Asia.

1. *C. coccinea* (L.) Spreng., painted cup; in Canada in Man and Ont.
2. *C. miniata* Dougl.; from s. Alaska to BC and Man and south.
3. *C. pallida* (L.) Spreng.; in arctic Canada, Alaska, Asia and e. Europe.
4. *C. rhexifolia* Rydb.; similar to 2, in Sask and Alta.
5. *C. sessiliflora* Pursh; in Canada in Sask and Man.

Cercospora sp.: on 3 Alaska [175].

Cronartium coleosporioides Arth.: II III on 2 BC [1198; cf. 15, p. 29]; on 4 Sask. II III resulted on 4 by inoculation with aeciospores of *Peridermium stalactiforme* Arth. & Kern [1195].

Fusarium avenaceum (Fr.) Sacc. and *F. semitectum* Berk. & Rav.: on 3 Alaska [1038].

Leptosphaeria modesta (Desm.) Karst.: on 3 Alaska [175].

Mycosphaerella tassiana (de Not.) Johans.: on *C. spp.* BC [50].

Ophiobolus acuminatus (Sow.) Duby: on old stems of 1 Man [93, p. 55].

Phoma complanata (Tode ex Fr.) Desm.: on 3 Frank [604].

Pleospora comata Auersw. & Niessl: on 2 BC [50].

Puccinia andropogonis Schw. (*P. a. var. micropuncta* Arth.): 0 I on 4 Sask [93, p. 65; cf. 15, p. 120].

Ramularia coccinea Dearn. & Bisby (non *R. coccinea* (Fckl.) Vestergr.): on leaves of 1 Man [93, p. 124].

Sphaerotheca fuliginea (Schlecht. ex Fr.) Poll. (*S. humuli* (DC.) Burr. var. *f. Schlecht.*) Salm.): on *C. spp.* BC [50].

Catalpa Scop.

BIGNONIACEAE

Deciduous, rarely evergreen, trees of warm regions of e. N. America and e. Asia, cult.

1. *C. bignonioides* Walt., common catalpa, catalpa; native of south-central US, cult. and escaped further eastward and northward.

Alternaria catalpae (Ell. & Martin) J.B. Parker: on 1 Ont F61:76.

A. (?tenuis auct. sensu Wiltshire): from leaf spot of *C. sp.* Ont 38:92.

Catalpa

- Botrytis Peinerea* Pers.: on leaves and pods of *C. sp.* BC 46:76.
Nectria cinnabarina Tode ex Fr.: canker, chancre: on *C. sp.* Que 57: 117.
Phyllosticta catalpae Ell. & Martin: reported on *C. sp.* NS [1138].
Verticillium albo-atrum Reinke & Berth.: wilt, flétrissure verticillienne: on *C. sp.* Ont 56:118, 57:117; presence of organism assumed from the symptoms.
Nonparasitic: drought, sécheresse: on *C. spp.* NS 39:97.

Cattleya Lindl.

ORCHIDACEAE

Perennial herbaceous plants of tropical America; cult. under glass for cut flowers or in fanciers' collections for the showy bloom.

- Glomerella cincta* (Stonem.) Spauld. & Schrenk: on *C. sp.* BC 57:123.
Virus: mosaïc, mosaïque: on *C. sp.* Ont 50:122.

Caulophyllum Michx.

BERBERIDACEAE

Perennial herbs, one native to e. N. America and another to Asia.

1. *C. thalictroides* (L.) Michx., blue cohosh, graines à chapelet; in Canada from NB and NS to Man.

- Cercospora caulophylli* Pk.: on leaves of *1* Que 33:109.
Orbilia caulophylli Ell. & Ev.: on dead stems of *1* Ont [979].
Streptotinia caulophylli M.E.Elliott: on *1* Que [275, p. 1200].

Ceanothus L.

RHAMNACEAE

Deciduous or evergreen shrubs or small trees, mainly in w. N. America and s. to Mexico; cult. for their ornamental flower clusters.

1. *C. americanus* L., New Jersey tea, thé du Nouveau-Jersey; in Canada in Que, Ont and Man.
2. *C. sanguineus* Pursh; in Canada in BC.

- Cylindrosporium ceanothi* Ell. & Ev.: on leaves of *2* BC [535]; type species of *Phloeosporella* Höhn. [cf. 17].

Cedrus Trew

PINACEAE

Tall, evergreen trees, native to the Mediterranean region and Asia.

1. *C. deodora* (Roxb.) Loud., native to Himalayas; probably hardy only on Vancouver I. and coastal BC.

- Botrytis Peinerea* Pers.: destroyed new growth of *1* in a nursery at Vancouver, BC 31:81.

Celastrus L.

CELASTRACEAE

Twining shrubs of e. N. America, e. and s. Asia and Australia; cult. for their ornamental fruit and seeds.

1. *C. scandens* L., climbing bittersweet, bourreau des arbres; in Canada from Que to Man.

- Cytospora ambiens* Sacc.: on *1* Man [93, p. 132].
Diatrype celastris Dearn. & Bisby: on dead stems of *1* Man [93, p. 59].
Dinemasporium robiniae Gerard: on old branches of *1* Man [93, p. 133].
Fomes scutellatus (Schw.) Cke.: on *1* Man [93, p. 81].
Hysterium insidens Schw.: on wood of *1* Man [93, p. 43].
Nectria cinnabarina Tode ex Fr.: on *1* Man [93, p. 46].
Phyllactinia guttata (Fr.) Lév. (*P. corylea* (Pers.) Karst.): on *1* Man [93, p. 44].
Phyllosticta spermoides Pk.: on *1* Man [93, p. 136].
Polyporus tulipiferae (Schw.) Overh.: on *1* Man [93, p. 84].
Ramularia celastris Ell. & Martin: on leaves of *1* Man [93, p. 124].
Sphaeropsis ?propullans (Schw.) Pk.: on stems of *1* Man [93, p. 140].
Valsa ambiens (Pers. ex Fr.) Fr. (imperfect state *Cytospora a.*, q.v.): on *1* Man [93, p. 57].

Celosia L.

AMARANTHACEAE

Plants native to warm countries of both hemispheres; the cult. kinds are annuals.

1. *C. cristata* L. (*C. argentea* L. var. *c.* (L.) Kuntze), cockscomb, passe-velours; commonly cult. for ornament, distinct from *C. argentea* L., quail grass, a weedy annual of tropical countries [cf. 349].

- Phyllosticta sp.*: on leaves of *1* Que 57:123.

- ?Aster yellows virus: aster yellows, jaunisse de l'aster: on *1* NB 37:75, PEI 40:90.

Cenchrus L.

GRAMINEAE

Annual or sometimes perennial grasses, native to tropical and temperate regions; some species are troublesome weeds.

1. *C. longispinus* (Hack.) Fern. (*C. tribuloides* auct.) sandbur; an annual, in Canada in Ont.

- Sorosporium cenchrus* Henn.: smut, charbon: on *1* Ont [292].

Centaurea L.

COMPOSITAE

Annual, biennial or perennial herbs, mostly native to the Mediterranean region; many cult. for their flowers; a few are serious weeds in Canada.

1. *C. cyanus* L., bachelor's button or cornflower, bluet; slender annual, sometimes escaped from cult.; native to Europe.
2. *C. imperialis* Hort.; a variant or hybrid of 3.
3. *C. moschata* L. (*C. suaveolens* L.), sweet sultan, fleur de Grand Seigneur; annual, sometimes spread from cult.; native to s.w. Asia.

Other host: 4, *C. jacea* L.

Erysiphe cichoracearum DC. ex M  rat: powdery mildew, blanc; on *C. sp.* Ont 30:85, 33:66.

Mycosphaerella tassiana (de Not.) Johans.: on 4 BC [50]; host determination doubtful.

Pleospora herbarum (Fr.) Rabh. var. *h.* (*P. armeriae* (Cda.) Ces. & de Not.): on 4 BC [50]; host determination doubtful.

Puccinia carthami Cda.: urediniospores of this rust infected 1, but the host was resistant Ont 43:28.

P. cyani Pass.: rust, rouille: 0 II III on 1 Ont 27:94, BC Ont NS 38:99, [cf. 15, p. 350].

Pythium sp.: reported the cause of root rot of 1 Ont 47:105.

Septoria centaureicola Brun. var. *brevispora* Pk.: leaf spot, tache septorienne: on 1 BC 47:105, Ont 42:98, 44:107; on 2, 3 Man 40:90.

Aster yellows virus (callistephus virus 1): aster yellows, jaunisse de l'aster: on 1 PEI 43:105; on 3 NB 33:74, 32:88.

Centranthus DC.

VALERIANACEAE

Annual or perennial herbs of the Mediterranean region, cult. for ornament.

1. *C. ruber* (L.) DC., red valerian or jupiter's beard, barbe de Jupiter; native to Europe and s.w. Asia.

Aster yellows virus (callistephus virus 1): aster yellows, jaunisse de l'aster: on 1 NB 47:105.

Cephalanthus L.

RUBIACEAE

Deciduous or evergreen shrubs or small trees, native to N. America, Asia and Africa.

1. *C. occidentalis* L., buttonbush, bois noir; in Canada from NS and NB to Que and Ont, cult. for its attractive flower heads.

Puccinia seymouriana Arth.: 0 I on 1 Que [862; 15, p. 166].

Cerastium L.

CARYOPHYLLACEAE

Annual or perennial herbs of worldwide distribution in cool and temperate regions; a few cult. in rock gardens.

1. *C. alpinum* L. (*C. arcticum* Lange); arctic regions, south in Canada to Nfld and Que; the cult. material is mostly *C. a.* var. *lanatum* (Lam.) Hegetschw.

2. *C. arvense* L., field chickweed, mouron d'alouette; throughout Canada and also in Eurasia.
3. *C. beeringianum* Cham. & Schlecht.; Labr, Nfld, Que, Yukon, Alaska and n.e. Asia.
4. *C. ceratoides* (L.) Britt. (*C. trigynum* Vill.); arctic regions, s. to Nfld and Que; also in Eurasia.
5. *C. maximum* L.; arctic regions, Yukon and Alaska to Eurasia.
6. *C. regelii* Ostenf.; arctic regions in E. Canada.
7. *C. vulgatum* L., mouse-ear chickweed, c  raiste vulgaire; naturalized from Eurasia. A common weed of lawns, pastures and cult. land across Canada.

Ascochyta dianthi (Alb. & Schw.) Lib.: on 1 Greenl [601].

Calloria erythrostigmoides Rehm: on 4 Greenl [901].

Heteropatella umbilicata (Pers. ex Fr.) Jaap (*Septoria cercosperma* Rostr.): on 4 Greenl [902].

Isariopsis episphaeria (Desm.) H  hn. (*I. alborosella* (Desm.) Sacc.): on *C. sp.* NS [1138]; on 1, 3, 6 Frank [971].

Leptosphaeria silenes-acaulis de Not. (*L. stellariae* Rostr.): on 1 ?Keew [604].

Leptotrochila cerastiorum (Wallr.) Sch  epp [973, p. 261] (*Pseudopeziza c.* (Wallr.) Fckl.): on 1 Greenl [900].

Melampsorella caryophyllacearum Schroet. (*M. cerastii* (Pers.) Schroet.): II III on 1 Que [828]; on 1 BC, 2 Alaska Alta Sask, 3 BC, 7 Man [15, p. 21]; on 2 Sask Man [93, p. 63]; on 2, 3 Alaska [175]; on 2 NB, 7 NS [1138]; on 2, 7 BC [1198]; on 7 Ont 22:190.

Mycosphaerella densa (Rostr.) Lind: on *C. sp.* Frank [52, 971].

M. tassiana (de Not.) Johans. (*M. pachyasca* (Rostr.) Vestergr., *Sphaerella stellarianearum* (Rabh.) Karst.): on 1 Greenl [601, 603, 604]; on 1 f. *pulvinatum* Greenl [602]; on 1, 4 Greenl [902]; on 2, 4 Greenl [899]; on 4 Greenl [901]; on 5 Yukon [600].

M. tassiana var. *arctica* (Rostr.) Barr: on *C. sp.* Frank [52].

M. tassiana var. *tassiana*: on *C. sp.* Que, *C. sp.*, 1 Frank [52].

Peronospora alsinacearum Casp.: on 4 Greenl [900, 902].

P. septentrionalis G  um.: on 4 Labr [605].

P. tornensis G  um. [*P. conferta* (Ung.) Ung.]: on 1 Frank [604].

Phoma cerastii-maximi Dearn.: on 5 Mack [250, p. 19C].

P. herbarum West.: on *C. sp.*, 4 Greenl [902]; on 1, 2 Greenl [899].

Platyspora pentamera (Karst.) Wehm. (*Clathrospora p.* (Karst.) Berl.): on *C. sp.* Frank [52]; on 1 Greenl [603].

Pleospora ambigua (Berl. & Bres.) Wehm.: on *C. sp.* Frank [52].

P. cerastii Oud. (*Pyrenophora c.* (Niessl) Sacc.): on 1 Greenl [603, 604]; on 1 f. *pulvinatum* Greenl [602].

P. comata Auersw. & Niessl (*Pyrenophora c.* (Niessl) Sacc.): on 1 Frank [52], Greenl [899, 901]; on 5 Yukon [600].

P. helvetica Niessl: on *C. sp.*, 1, 6 Frank [52].

Cerastium

- Pleospora herbarum* (Fr.) Rabh.: on 1 Greenl [899, 900]; on 1 f. *pulvinatum* Greenl [602].
P. penicillus (Schm.) Fekl. var. *p.* (*Pyrenophora chrysospora* (Niessl) Sacc.: on 1 Frank [600], Greenl [603].
P. phaeocomoides (Berk. & Br.) Wint. (*P. vulgaris* Niessl): on 1 Greenl [901].
P. phaeocomoides var. *infectoria* (Fekl.) Wehm. (*P. i.* Fekl.): on 1 Greenl [603]; on 1 f. *pulvinatum* Greenl [602].
Puccinia arenariae (Schum.) Wint. [*P. armeriae*, sic]: on 1 Greenl [15, p. 236; 899; cf. 828].
Selenophoma drabae (Fekl.) Petr. (*Rhabdospora d.* (Fekl.) Berl. & Vogl.): on 1 Greenl [601].
Ustilago violacea (Pers.) Roussel: on 5 Alaska [175, 292].

Chaenomeles Lindl.

ROSACEAE

Deciduous or half-evergreen shrubs or small trees, native to e. Asia.

1. *C. japonica* (Thunb.) Lindl. (*Pyrus maulei* Mast.), dwarf Japanese quince, cognassier du Japon; native to Japan.
2. *C. lagenaria* (Loisel.) Koidz. (*C. japonica* Hort., non (Thunb.) Lindl.), Japanese quince, cognassier du Japon; native to China.

Entomosporium maculatum Lév.: on leaves of 1 NS [1138].

Nectria cinnabarina Tode ex Fr. (*Creonectria purpurea* (L.) Seav.): on 2 BC [50].

Tubercularia vulgaris Tode: on 1 Ont 33:120.

Chamaecyparis Spach

PINACEAE

Coniferous trees, native to N. America and e. Asia.

1. *C. lawsoniana* (A.Murr.) Parl., Oregon cedar, cyprès de Lawson; native to Calif and Oregon. A very handsome conifer of which many garden forms are recognized in Europe.
2. *C. nootkatensis* (Lamb.) Spach, yellow cedar, cyprès jaune; along the Pacific coast from Alaska to Oregon. Used for poles, piles and boatbuilding; resistant to decay.
3. *C. pisifera* (Sieb. & Zucc.) Endl., Sawara cedar; native to Japan.
4. *C. thyoides* (L.) B.S.P., white cedar, cyprès blanc; from the New England states south.

Armillaria mellea (Vahl ex Fr.) Kummer: root rot, pourridié agaric: from C. sp. BC [1198].

Asterinella cupressina (Rehm) Theiss.: on 2 Alaska [175].

Coryneum berckmanii Milbr.: on C. 'rosedale' BC [1198].

Cytospora ?pinastri (Fr.) Sacc.: associated with dieback of 3 NS 51:104.

Gymnosporangium biseptatum Ell.: III on C. sp. seedling BC [535].

G. nootkatense Arth.: rust, rouille: II III on 2 Alaska [15, p. 358; 175], BC [1198].

Herpotrichia nigra Hartig: brown felt blight, feutrage brun: on 2 BC [1198].

Merulius himantoides Fr.: brown cubical rot, carie brune cubique: from 2 BC [1198]; see *Abies*.

Peniophora crassa Burt ex Pk.: on 2 Alaska [175].

Pestalotia funerea Desm.: associated with canker on 1 BC 47:100.

Phytophthora cinnamomi Rands: isolated from 1 BC 57:117, [1198].

P. lateralis Milbr. & Tucker: root and crown rot, pourridié phytophthoréen: on 1 BC 41:81, F52:147, [1198]; rather common and destructive, 61:41.

Poria lenis (Karst.) Sacc.: on 2 Alaska [175].

P. weirii Murr.: on C. sp. BC [1198].

Pythium sp.: on 1 BC [1198].

Xeromphalina campanella (Batsch ex Fr.) Kühner & Maire: white stringy rot, carie blanche filandreuse: from 2 BC [1198].

Chamaedaphne Moench

ERICACEAE

One evergreen shrub circumpolar and sometimes planted in rock gardens.

1. *C. calyculata* (L.) Moench, leatherleaf, faux-blquets; a Eurasian plant, represented in N. America by *C. c.* var. *angustifolia* (Ait.) Rehder from Nfld and NS to Alta, BC and Alaska and *C. c.* var. *latifolia* (Ait.) Fern. from Labr, Nfld and NS to Mack.

Chrysomyxa ledi de Bary var. *cassandrae* (Pk. & Clint.) Savile (*C. cassandrae* (Pk. & Clint.) Tranz.): II III on C. sp. Alaska [175]; on 1 Yukon Mack Que [947], Man [93, p. 62], Ont [828], NS [1138], [cf. 15, p. 34].

Dermatea pezizoides Pk. ex Conners: (*Cenangium pezizoides* Pk.): on 1 Ont 33:109; not a *Dermitea* but systematic position uncertain [Groves in litt.].

Exobasidium vaccinii Wor.: on leaf galls of 1 Que [958], NS [1138].

E. affin. vaccinii: on 1 Que Nfld [958].

Gibbera cassandrae (Pk.) Barr (*Venturia c.* Pk.): on 1 Que [53].

G. pulchella (Cke. & Pk.) Petr.: on 1 Ont F60:66.

Gloeosporium chamaedaphnes Dearn. [*Monostichella c.* (Dearn.) Arx, 15a, p. 72]: on leaves of 1 Ont [93, p. 130].

Synchytrium vaccinii Thomas: on 1 NS [1138].

Venturia pulchella Cke. & Pk.: on leaves of 1 Man Ont [93, p. 56], Ont 34:99, NS [1138].

Cheiranthus L.

CRUCIFERAE

Herbaceous or subshrubby perennials, native to the Canary Islands and s. Europe to central Asia.

1. *C. cheiri* L., wallflower, giroflée; native to s. Europe.

Alternaria raphani Groves & Skolko: 1 was experimentally infected with the fungus Ont [23].

Ascochyta cheiranthi Bres.: on 1 Alaska [175].
Botrytis cinerea Pers.: on 1 Alaska [175].
Mycosphaerella tassiana (de Not.) Johans.: on *C. sp.* BC [50].
Peronospora parasitica (Pers. ex Fr.) Fr. (*P. cheiranthi* Güm.): downy mildew, mildiou: on 1 BC 35:74, 45:110, 55:120.
Phytophthora megasperma Drechs.: foot rot, pourriture du pied: on 1 BC 53:115, [535].
Sclerotinia sclerotiorum (Lib.) de Bary: almost completely destroyed a crop of 1 in 1941, BC 42:43.

Chelone L. SCROPHULARIACEAE

Smooth perennial herbs, mostly in the e. and s. US; sometimes cult. for ornament.

1. *C. glabra* L., balmony, tête de tortue; in Canada from Nfld to Man.

Erysiphe galeopsidis DC. ex Mérat: on 1 NS [1138], and also in NB PEI although reported as *E. cichoracearum* DC., 34:99, [1138].

Septoria wilsonii G.W.Clint.: on 1 Que 32:101.

Chenopodium L. CHENOPODIACEAE

Mainly annual herbs, essentially cosmopolitan.

1. *C. album* L., lamb's quarters or pigweed, chou-gras; an abundant weed in the agricultural areas of Canada; a native of Europe.
2. *C. capitatum* (L.) Asch., strawberry blite, blette; NB to BC and Alaska, also in Eurasia.
3. *C. gigantospermum* Aellen (*C. hybridum* L. var. *gigantospermum* (Aellen) Rouleau), maple-leaved goosefoot, pied d'oie; native in Canada from NB to BC.
4. *C. glaucum* L.; introduced from Europe into Eastern Canada but 4a, *C. g.* var. *salinum* (Standl.) Boiv., native to Western Canada.

Cercospora dubia (Riess) Wint.: on 1, common in Man [93, p. 114], Que PEI 25:78, PEI [1138].

Diplodia ellisii Sacc.: on dead stems of 1 Man [93, p. 133].

Fusarium spp.: isolated from basal parts or roots of plants apparently of 1 in Man: *F. acuminatum* Ell. & Ev., *F. culmorum* (W.G.Sm.) Sacc., *F. equiseti* (Cda.) Sacc., *F. oxysporum* Schlecht., *F. sambucinum* Fekl. [335].

Meloidogyne sp. (*Caconema radiculicola* (Greef) Cobb): root-knot nematode, nodosité des racines: on 1 in greenhouse soil BC 32:110.

Peronospora farinosa (Fr.) Fr. (*P. effusa* (Grev.) Rabh., *P. variabilis* Güm.): on 1 BC [535], Alta Que PEI 34:99, common and widespread in Sask Man [93, p. 30], NB NS PEI [1138].

Phoma longissima (Pers.) West.: on dead stems of 1 Sask Man [93, p. 134].

Physoderma pulposum Wallr. (*Urophlyctis pulposa* (Wallr.) Schroet.): on 1 Sask, 4 Man [93, p. 29].

Puccinia aristidae Tracy (*P. subnitens* Diet.): 0 1 on 1 Alta 24:58, [15, p. 158], Sask Man [93, p. 66].

Septoria sp.: on 2 Sask 29:74.

Stagonospora atriplicis (West.) Lind: on 1, 2, 3 Man, 1 Sask [93, p. 140].

Uromyces peckianus Farl.: 0 1 on 1 experimentally infected from III on *Distichlis* NS [1138]; on 1 NS [15, p. 160].

Clover yellow mosaic virus: found in 1 in ?BC [860].

Chimaphila Pursh PYROLACEAE

Low, nearly herbaceous plants of the northern hemisphere.

1. *C. umbellata* (L.) Bart.; the typical variety is known only in Eurasia, but 1a, *C. u.* var. *cisatlantica* Blake, prince's pine or pipsissewa, herbe à peigne, occurs in NS, Que and Ont, and 1b, *C. u.* var. *occidentalis* (Rydb.) Blake, in BC.

Mycosphaerella chimaphilae (Ell. & Ev.) Höhn. (*M. chimaphilina* (Pk. in Sacc.) House): on 1 BC [50], Man [93, p. 53]; on 1a Man Ont Que, 1b BC [827].

Phyllosticta pyrolae Ell. & Ev.: on 1a Ont [827].

Pucciniastrum pyrolae Diet. ex Arth.: II III on 1a BC Que, 1b BC [827].

Chiogenes Salisb. ERICACEAE

Evergreen creeping plants, two species in N. America and e. Asia.

1. *C. hispidula* (L.) Torr. & Gray (*Gaultheria h.* (L.) Bigel), creeping snowberry, petit thé; in Canada in Labr and Nfld and from NS to BC.

Chrysomyxa chiogenis Diet.: II III on 1 BC [1198], BC Nfld [955], Ont Que NS [947], Que 31:118, NS PEI [1138], Nfld [15, p. 45].

Microsphaera penicillata (Wallr. ex Fr.) Lév. var. *vaccinii* (Schw.) W.B. Cke. (*M. alni* (Wallr.) Salm. var. *v.* (Schw.) Salm.): on 1 BC [50].

Choisya Kunth RUTACEAE

Shrubs native to s. US and Mexico.

1. *C. ternata* HBK., Mexican orange; native to Mexico; cult. for its fragrant flowers.

Nectria cinnabarina Tode ex Fr. (*Creonectria purpurea* (L.) Seav.): associated with dieback of 1 BC 34:87, [50].

Chrysanthemum L. COMPOSITAE

Annual and perennial herbs mostly native to the Old World, several widely cult. for ornament.

1. *C. arcticum* L.; n. Man, arctic Canada, w. BC, Alaska and Eurasia.
2. *C. coccineum* Willd., common pyrethrum;

Chrysanthemum

native to s.w. Asia; a popular florists' and cut-flower plant.

3. *C. frutescens* L., marguerite or Paris daisy, marguerite des Canaries. Native to the Canary Islands.
4. *C. integrifolium* Richards.; arctic regions of Canada, Alaska and e. Asia.
5. *C. leucanthemum* L., including 1a, *C. l.* var. *pinnatifidum* Lecoq & Lamotte, oxeye daisy, marguerite. An early introduction from Europe and now an abundant weed in Eastern Canada and widely distributed in n. Alta and BC.
6. *C. maximum* Ramond, Shasta daisy; native to the Pyrenees.
7. *C. morifolium* (Ramat.) Hemsl. (*C. hortorum* Bailey), chrysanthemum, chrysanthème. Cultigen of Chinese origin, long cult. in gardens as a perennial and extensively under glass as a cut-flower or potted plant.

Other host: 8, *C. monspeliense* L.

Agrobacterium tumefaciens (Sm. & Towns.) Conn: crown gall, tumeur du collet: on 3 BC, 7 of Ont origin in BC 52:112.

Aphelenchoides fragariae (Ritzema Bos) Christie (*A. ritzema-bosi* (Schwartz) Steiner & Buhner): leaf nematode, nématose foliaire: on 7 BC 34:83, Ont 38:99, Que 47:105, NS 56:125. The pest may sometimes be injurious Ont 57:123.

Botrytis cinerea Pers.: gray mold, moisissure grise: on *C. sp.* Alaska [175]; in blossom blight of 7 BC 31:91, Ont 50:122, NS 35:66; may be heavy during periods of humid weather, 50:112. On cuttings Ont 39:99, NS 40:90, and older plants BC 54:130.

Ceratobasidium anceps (Bres. & Syd.) Jackson: on 5 Ont [495].

Cylindrosporium chrysanthemi Ell. & Dearn.: leaf spot, tache cylindrosporiennne: on 7 Ont 24:54.

Erysiphe cichoracearum DC. ex Méral (*E. communis* Wallr. ex Fr., *Oidium chrysanthemi* Rabh.): powdery mildew, blanc: on *C. sp.* BC [50], Man [93, p. 44]; on 7 Alaska [175], BC 30:87, Alta Que 26:33, Sask 47:105, Man 39:102, Ont NS 49:102, Que 50:123, NB 32:88, [1138], PEI 37:74. Sometimes heavy in the open in late fall or almost anytime in poorly ventilated greenhouses.

Fusarium spp.: from diseased basal parts or discolored roots of *C. sp.* Man: *F. acuminatum* Ell. & Ev. with *F. solani* (Mart.) App. & Wr., *F. equiseti* (Cda.) Sacc., *F. oxysporum* Schlecht., *F. solani*; and in BC *F. oxysporum* [335].

Fusarium spp.: foot rot, pourridié fusarien: on 6 Sask 43:145; on 7 Man 38:99, Ont 53:115.

F. oxysporum: wilt, flétrissure: on 7 Que 61:111, ?Ont 49:103.

Heteropatella umbilicata (Pers. ex Fr.) Jaap (*Rhabdospora cercosperma* (Rostr.) Lind): on 4 Frank [600].

Leptosphaeria ogilviensis (Berk. & Br.) Ces. & de Not.: on stems of *C. sp.* NS [1138].

Meloidogyne sp. (*Heterodera marioni* (Cornu) Goodey): root-knot nematode, nodosité des racines: on *C. sp.* Que 52:112; on 2 BC [535]; on 7 BC 50:123.

Mycosphaerella tassiana (de Not.) Johans. (*M. pachyasca*

(Rostr.) Vestergr.): on *C. sp.* BC [50]; on 4 Frank [600].

Paratylenchus projectus Jenkins, alone or with *Pratylenchus penetrans* (Cobb) Filipjev & Stekh.: associated with stunted 7 Ont 61:111.

Phoma sp.: canker, chancre: on 7 Ont 45:110.

Pleospora cerastii Oud. (*Pyrenophora c.* (Oud.) Lind: on 1 'Hudson Bay' [604].

P. herbarum (Fr.) Rabh.: on 4 Mack [604].

P. penicillus (Schm.) Fckl.) var. *p.* (*Pyrenophora chrysospora* (Niessl) Sacc.): on 4 Frank [600].

Puccinia chrysanthemi Roze: rust, rouille: II on 7 BC Ont Que 52:112, Ont 53:115, 58:113, [cf. 15, p. 270].

Rhizoctonia solani Kühn: stem rot, rhizoctone commun: on 7 Ont 55:120, NS 31:111.

Sclerotinia sclerotiorum (Lib.) de Bary: wilt or dieback, flétrissure sclérotique: on 7 BC 51:111, and infection at leaf scars Ont 56:124, NS 46:82.

Septoria chrysanthemi Allesch. (*S. chrysanthemella* Sacc.): leaf spot, tache septorienne: on 6 BC 36:83, Alta 43:23, Man 33:73, [93, p. 137]; on 7 BC 45:110, Alta 40:90, Ont 38:106, Que 47:105, NS 38:99, [1138].

S. leucanthemi Sacc. & Speg. (*S. macrosporia* Dearn.): leaf blotch, tache septorienne: on 7 Ont 36:74, NS 58:113.

Verticillium spp.: wilt, flétrissure verticillienne: on 7 BC [535], Alta 45:110, Ont 42:98; sometimes destructive Ont 45:110.

Aster yellows virus: aster yellows, jaunisse de l'aster: on 2, 3, 5 PEI 43:105; on 6 PEI 34:91; on 7 BC [535], Alta 38:99, Ont 54:130, NB 29:67; on 8 Ont 44:107.

Chrysanthemum stunt virus: stunt, rabougrissement viral: on 7 Ont NS 47:105, Alta 55:120. Often reported, but losses usually slight since thorough indexing was introduced.

Tomato spotted wilt virus: tomato spotted wilt, tache de bronze: on 7 Alta 41:89, Que 44:107, NB 42:98.

Chemical injury: from spraying with Parathion when the greenhouse temperature was over 100 F, Ont 49:103.

Nonparasitic: oedema, œdème: on 7 Ont 49:103, Que 50:123.

Nonparasitic: topple, affaissement: on 7 BC 53:115, Sask 54:130.

Chrysopsis Nutt.

COMPOSITAE

Mainly perennial low herbs of N. America, sometimes transferred to gardens.

1. *C. villosa* (Pursh) Nutt. (*C. hirsutissima* Greene), golden aster; in Canada from s. Man to BC.

Entyloma compositarum Farl.: on 1 Sask [946, cf. 292].

Pleospora comata Auersw. & Niessl: on 1 BC [50].

Puccinia stipae Arth.: 0 I on 1 Sask 30:95, [93, p. 71; cf. 15, p. 140].

Cichorium L.

COMPOSITAE

Annual, biennial or perennial herbs mostly of the Mediterranean region and in Abyssinia.

1. *C. endivia* L., endive, endive; probably a native of India; cult. as a salad plant.
2. *C. intybus* L., chicory, chicorée sauvage. A weedy perennial in all provinces of Canada, especially in E. Canada and s. BC; cult. for the root, which is dried and used as a substitute for coffee, and as a salad plant.

Mycosphaerella tassiana (de Not.) Johans.: on 2 BC [50].

Pleospora herbarum (Fr.) Rabh.: on 2 BC [50].

Pseudomonas cichorii (Swingle) Stapp: heart rot, pourriture bactérienne du cœur: on 1 Ont 56:60.

Puccinia hieracii (Roehling) Mart.: 0 I II III on 2 Ont Que NS [15, p. 352; cf. 1138].

Ramularia cichorii Dearn. & House: on leaves of 2 BC [535].

Sclerotinia sclerotiorum (Lib.) de Bary: drop, affaïssement sclérotique: on 1 Alta 45:53, Man 43:50.

Nonparasitic: tipburn, brûlure de la pointe: on 1 Ont 56:60.

Cicuta L.

UMBELLIFERAE

Very poisonous plants of the n. temperate region.

1. *C. douglasii* (DC.) Coult. & Rose; Alaska and BC.
2. *C. maculata* L., water hemlock, carotte à Moreau; NS to Ont.
3. *C. occidentalis* Greene; BC, Alta, Sask, Man, n. Ont and n. Que.

Mycosphaerella sagedioides (Wint.) Lindau: on 1 BC [50].

Puccinia cicutae Lasch: 0 I II III on 1 Alaska [175], BC [535]; on 2 Ont [828], NS [1138]; on 2 Man NS, 3 Sask [15, p. 316], [cf. 93, p. 67].

Uromyces lineolatus (Desm.) Schroet. (*U. scirpi* (Cast.) Burr.): 0 I on 3 Sask [93, p. 73]; on 2 experimentally from III on *Scirpus paludosus* NS [1138].

Cimicifuga L.

RANUNCULACEAE

Tall perennial herbs of the northern hemisphere, sometimes planted for ornament.

1. *C. racemosa* (L.) Nutt., black snakeroot; known in Canada in s. Ont.

Other host: 2, *C. japonica* Spreng.

Ascochyta sp.: on leaves of *C. sp.* Que 56:125.

Puccinia recondita Rob. ex Desm.: 0 I on 1 Ont [828; cf. 15, p. 180].

Virus: mosaïc, mosaïque: on 2 Que 44:107.

Cinna L.

GRAMINEAE

Tall perennial grasses of N. America and Eurasia.

1. *C. arundinacea* L.; in Canada in s. Ont and s.w. Que.
2. *C. latifolia* (Trev.) Griseb.; Labr, Nfld, NS to Alaska and in Eurasia.

Claviceps purpurea (Fr.) Tul.: on 2 Alaska [1042].

Drechslera catenaria (Drechl.) Ito: on 1 Ont [993].

Hendersonia crastophila Sacc.: on 2 Alaska [1037].

Mycosphaerella tulasnei (Jancz.) Lindau: on 2 Alaska [1038].

Ophiobolus graminis Sacc.: on 2 Alaska [1042].

Puccinia graminis Pers.: II III on 1, 2 Ont [15, p. 174].

Stagonospora intermixta (Cke.) Sacc.: on 2 Alaska [1042].

Circaea L.

ONAGRACEAE

Low perennial herbs of the temperate and cool regions of the northern hemisphere.

1. *C. alpina* L.; from Labr, Nfld and NS to Man, Alta and Alaska.
2. *C. canadensis* Hill; in Canada in NS and Que.
3. *C. pacifica* Aschers. & Magnus (*C. alpina* var. *p.* (A. & M.) M. E. Jones); in Canada in s.w. Alta and BC.
4. *C. quadrisulcata* (Maxim.) Franch. & Sav., enchanter's nightshade, circée; Asia, represented in N. America by 4a, *C. q.* var. *canadensis* (L.) Hara (*C. latifolia* Hill, *C. lutetiana* auct. Am., non L.), in Canada from NS and NB to Ont.

Puccinia circaeae Pers.: III on *C. sp.*, 1 Alaska [175]; on 1 Alaska Sask Ont NS Nfld, 3 BC, 4 Ont Que NS [15, p. 250]; on 1 Alaska BC Alta Ont Que, 3 BC, 4a Ont Que [964]; on 1 Que 33:109, [197]; on 2 NS [1138]; on 4 Man [93, p. 67].

Cirsium Mill.

COMPOSITAE

Mostly biennial or perennial herbs of the northern hemisphere; some are important weeds.

1. *C. arvense* (L.) Scop., Canada thistle, chardon. A common weed throughout the agricultural areas of Canada; probably introduced from Europe and also native to w. Asia and n. Africa.
2. *C. flodmanii* (Rydb.) Arth.; in Canada in Man, Sask and Alta, and rare in Que and Ont.
3. *C. muticum* Michx., swamp thistle or dunce-nettle; in Canada in Nfld and NS and from Que to Sask.
4. *C. undulatum* (Nutt.) Spreng., prairie thistle, chardon des prairies; in s. Sask, Alta and BC,

Cirsium

including 4a, *C. u.* var. *megacephalum* (Gray) Fern. (*C. m.* (Gray) Cockerell).

5. *C. vulgare* (Savi) Tenore (*C. lanceolatum* Scop. et auct. al., non Hill), bull thistle, gros chardon; in Canada from Nfld to BC. An abundant weed in E. Canada and s. BC.

Other host: 6, *C. douglasii* DC. var. *canescens* (Petr.) J. T. Howell (*C. breweri* (Gray) Jeps.); Calif, not in BC.

Albugo tragopogonis Pers. ex S.F.Gray: on 1 Sask Man [93, p. 29], Que 25:78, NS [1138].

Meloidogyne sp. (*Caconema radicicola* (Greef) Cobb, *Heterodera marioni* (Cornu) Goodey): root-knot nematode, nodosit  des racines: on 1 in greenhouse soil BC 32:110; in field of strawberries on 1 BC 48:93.

Mollisia patrocineria (Cke.) Phill.: on old stems of 1 Man [93, p. 40].

Mycosphaerella punctiformis (Pers. ex Fr.) Starb. var. *clematidis* Jaap: on 5 BC [50].

M. tassiana (de Not.) Johans.: on *C.* spp. BC [50].

Ophiobolus acuminatus (Sow.) Duby: on *C.* sp. NS [1138]; on stems of 5 BC [50].

O. porphyrogonus (Tode) Sacc.: on dead stems of 1 Man [93, p. 55].

Phialea cyathoidea Bull. ex Gill.: on stems of 1 Man [93, p. 41].

Pistillaria micans Pers. ex Fr.: on decayed stems of *C.* sp. NS [1138].

Platyspora permunda (Cke.) Wehm. [1141, p. 254] (*Clathrospora baccata* Ell. ex Barr): on *C.* spp. BC [50, p. 254].

Pleospora herbarum (Fr.) Rabh.: on *C.* sp. BC [50].

Puccinia calcitrapae DC. (*P. cirsii* Lasch non Kirchn.): 0 II III on *C.* spp. Sask, 2 Sask Man, 4 Man [93, p. 67]; on 4 Alta [15, p. 348]; on 5 Ont [828]; on 6 BC [1199].

P. cnici Mart.: 0 II III on 5 BC Ont [15, p. 347], NS [1138], [cf. 828].

P. punctiformis (Strauss) R hling (*P. obtegens* Tul., *P. suaveolens* Rostr.): 0 II III on 1 BC 34:99, [535], Sask 24:58 but not confirmed, Ont Que NS [15, p. 347], NB NS PEI [1138].

Pyrenochaeta erysiphoides Sacc.: on stems of 1 Man [93, p. 136].

Sclerotinia sclerotiorum (Lib.) de Bary: on 1 Man [93, p. 42].

Septoria cirsii Niessl: on 1 Sask Man [93, p. 138].

Thecaphora trailii Cke.: on 4 BC [957].

Uromyces junci (Desm.) Tul.: 0 I on 2 Man, 4 Alta, 4a Sask [15, p. 217]; on 2 Sask Man, 4, 4a Sask [93, p. 73].

Aster yellows virus (callistephus virus 1): aster yellows, jaunisse de l'aster: on 1 NB 32:101.

Cissus L.

VITACEAE

Deciduous or evergreen shrubs, native to tropical and warm temperate regions.

Cladosporium cladosporioides (Fres.) De Vries (*Hormodendron c.* (Fres.) Sacc.): caused a black mold on a plant of *C. sicyoides* L. in a greenhouse Que 41:89.

Citrullus Neck.

CUCURBITACEAE

Annuals or perennials of tropical Africa and probably Asia; one widely grown for its edible fruits.

1. *C. vulgaris* Schrad., watermelon, melon d'eau; native to tropical and s. Africa. 1a, *C. v.* var. *citroides* Bailey, citron or preserving melon, citron.

Alternaria cucumerina (Ell. & Ev.) J.A.Elliott: alternaria rot, pourriture alternarienne: on fruits of 1 Ont 57:92.

Ascochyta cucumeris Fautr. & Roum.: from seed of 1 Man [374].

Cercospora sp. (?*citrullina* Cke.): cause of a leaf spot of 1 NB 29:42.

Cladosporium cucumerinum Ell. & Arth.: leaf spot, tache des feuilles: on 1 Ont 38:70.

Colletotrichum orbiculare (Berk. & Mont.) Arx (*C. lagenarium* (Pass.) Ell. & Halst.): anthracnose, anthracnose: on 1 Man Ont 48:72, Que 51:84. Both stems and fruits are attacked and late in the season the disease may be severe Ont 52:80.

Curvularia pallescens Boed.: from seed of 1 BC [374].

Erysiphe cichoracearum DC. ex M rat: powdery mildew, blanc: on 1 Ont 48:72.

Fusarium acuminatum Ell. & Ev.: from decayed fruit and basal parts of plants of 1 affected by foot rot Man [335].

F. oxysporum Schlecht. f. *niveum* (E.F.Sm.) Snyder & Hansen (*F. bulbigenum* Cke. & Massee var. *niveum* (E.F.Sm.) Wr.): wilt, fl trissure fusarienne: on 1 BC Ont 46:63, Alta 38:69; on 1a Alta 38:35. When the disease is present it is often severe. Isolates from 1 unable to attack *Cucumis melo* (q.v.); field observations suggest that the pathogen may be seed borne Ont 48:22.

Mycosphaerella citrullina (C.O.Sm.) Gross.: on fruits of 1 Ont 39:68.

Phomopsis cucurbitae McKeen: found once causing a fruit rot of 1 Ont [701].

Pythium sp. and *Fusarium acuminatum* (q.v.) (*F. scirpi* Lamb. & Fautr.): cause of a fruit rot of 1 after hail damage Man 38:70, [335].

Sclerotinia sclerotiorum (Lib.) de Bary: cause of a fruit rot of 1 NS 38:70.

Septoria cucurbitacearum Sacc.: trace of leaf spot on 1a NS 53:80.

Trichothecium roseum (Pers.) Lk.: on fruits of 1 Man [93, p. 128].

Clarkia Pursh

ONAGRACEAE

Annual herbs of western S. and N. America, especially Calif; some cult. for their showy flowers.

1. *C. amoena* (Lehm.) Nels. & Macbr. (*Godetia a.* (Lehm.) G.Don., *G. grandiflora* Lindl.); BC to Calif.
2. *C. elegans* Dougl.; Calif.
3. *C. pulchella* Pursh; BC to Wash, Mont and SD.

Botrytis cinerea Pers.: gray mold, moisissure grise: on *C. sp.* (G. sp.) Alaska [175]; on *C. sp.* NB 27:94, NS 36:76, [1138].

Colletotrichum sp.: on *C. sp.* NB 26:33; on 2 Que 58:114.

Fusarium oxysporum Schlecht. and *F. solani* (Mart.) App. & Wr.: isolated from 2 severely affected by foot rot, pourridié fusarien, Man 41:89, [335].

F. solani and *Cylindrocarpon radiculicola* Wr.: associated with root rot and wilt of 1 Man 40:93, [335].

Peronospora arthuri Farl.: downy mildew, mildiou: on 2 BC [535]; on 3 BC [964].

Pucciniastrum pustulatum Diet. (*P. epilobii* Otth, sensu lat.): rust, rouille: II III on *C. sp.* (G. sp.) NB 41:92, PEI 37:77; on *C. sp.* Sask 39:102, Que 40:90, NS [1138]; on 1, 2 Alaska [175]; on 1 BC 47:110, Alta Sask Man Que PEI 36:76; on 1 BC Alta Sask Ont Que PEI, 2 from inoculum from *Epilobium hirsutum* Ont, 3 Ont [964]; on 2 Ont 43:106, PEI 37:75, [cf. 15, p. 15; 93, p. 64].

Aster yellows virus (callistephus virus 1): aster yellows, jaunisse de l'aster: on *C. sp.* (G. sp.) NB 49:105, 51:114; on *C. sp.* Sask 58:114, NB 35:66.

Nonparasitic: heat canker or girdle, chancre de chaleur: on *C. sp.* Sask 41:89.

Claytonia L.

PORTULACACEAE

Perennials of N. America, Asia, Australia and New Zealand.

1. *C. acutifolia* Pall.; native to Alaska and e. Asia.
2. *C. arctica* Adams; in Alaska and Siberia.
3. *C. caroliniana* Michx., spring beauty; in Canada from Nfld and NS to Sask.
4. *C. lanceolata* Pursh, spring beauty; Alta and BC.
5. *C. virginica* L.; in Canada in Que and Ont.

Endophyllum lacus-regis Savile & Parmelee: 0 I III on 3 Ont Que [970, p. 577; cf. 828].

Mycosphaerella tassiana (de Not.) Johans.: on 1 Alaska [604].

Peronospora claytoniae Farl.: on 5 Ont [970].

Physoderma claytoniana H.C.Greene var. *claytoniana*: on 3, 5 Que [970].

P. claytoniana var. *sparrowii* Savile & Parmelee: on 5 Ont [970, p. 587].

Puccinia claytoniicola Cummins: on 4 BC [970].

P. mariae-wilsoniae G.W.Clinton (*P. claytoniata* Pk.): 0 I III on 2 Alaska [175]; on 3 Que 29:75; on 3 Ont Que 34:99; on 3, 5 NS [1138]; on 5 Que 31:120, [cf. 15, p. 283].

P. mariae-wilsoniae var. *mariae-wilsoniae*: on 3 Ont Que, 5 Ont [970].

Synchytrium sp.: on 5 Ont Que [970].

Clematis L.

RANUNCULACEAE

Woody vines or herbs, mostly native to the temperate zone; many introduced into cult., but relatively few are common.

1. \times *C. jackmanii* Moore (*C. lanuginosa* \times *C. viticella*); a cultivar that originated in England.
2. *C. ligusticifolia* Nutt.; similar to 4, in Canada from Man to BC.
3. *C. verticillaris* DC.; in Canada from Que to Man.
4. *C. virginiana* L., virgin's-bower, herbe aux gueux; in Canada from NS to Que and Ont.

Ascochyta clematidina Thüm.: leaf spot and stem blight, ascochytose: on *C. spp.* Man Ont 43:105, PEI 41:89.

Cercospora squalidula Pk.: leaf spot, tache cercosporéenne: on 2 BC 34:99, Sask Man [93, p. 115].

Cylindrosporium clematidis Ell. & Ev.: on leaves of 2 Man [93, p. 129].

Didymaria clematidis Cke. & Harkn.: on 2 BC 34:99.

Erysiphe polygoni DC. ex Méral: powdery mildew, blanc: on 1 BC [535].

Leptosphaeria dumetorum Niessl: on *C. sp.* NS [1138].

Meloidogyne sp.: root-knot nematode, nodosité des racines: on 1 Ont 61:103.

Puccinia recondita Rob. ex Desm. (*P. clematidis* DC., *P. rubigo-vera* Wint. var. *agropyri* (Erikss.) Arth.): rust, rouille: 0 I on 2 BC Alta [15, p. 178], BC 33:110, [535], Alta Sask [93, p. 70]; on 3, 4 Ont [828]; on 4 Que 32:101, NS [1138].

Septoria clematidis Rabh.: leaf spot, tache septorienne: on 2 Sask 32:89, 33:110, Man 33:66; sometimes severe, 38:99, [cf. 93, p. 138].

Virus: mosaic, mosaïque: on *C. sp.* BC 33:66.

?Virus: yellows, jaunisse: on *C. sp.* Man 32:88, Ont 52:112.

Iron deficiency, carence de fer, lime-induced chlorosis: on *C. sp.* Man 45:110.

Cleome L.

CAPPARIDACEAE

Herbs or subshrubs, mostly in the tropics, particularly in the Americas and Africa.

1. *C. spinosa* L., giant spiderflower, cléome; native to tropical America, adventive in e. US.

Ascochyta sp.: on leaves of 1 Que 56:125.

Fusarium sp.: associated with a crown rot of 1 BC 44:107; also *F. acuminatum* Ell. & Ev. isolated from basal parts of wilted plants Man [335].

Virus: yellows, jaunisse: on 1 Que 56:125.

Iron deficiency, carence de fer: on 1 Man 61:112.

Clintonia Raf.

LILIACEAE

Short-stemmed herbs of N. America and e. Asia.

1. *C. borealis* (Ait.) Raf., poisonberry, les sauvages de la vallée; in Labr, Nfld and from NS to Man.
2. *C. uniflora* (Schult.) Kunth, queen's cup; BC to Alaska.

Clintonia

Ceratobasidium anceps (Bres. & Syd.) Jackson: on 1 Ont Que [495].

Puccinia mesomajalis Berk. & Curt.: on *C. sp.*, 2 Alaska [175]; on 1 Ont [93, p. 69]; Que 33:110; on 1 NS 2 BC [15, p. 278]; on 1 central Ont to Nfld, 2 Alaska BC Alta [963]; on 2 BC [1198], [cf. 828].

Clivia Lindl.

AMARYLLIDACEAE

Plants with fleshy roots, one cultivated.

1. *C. miniata* (Hook.) Regel, kafir-lily, clivie; native to S. Africa.

Colletotrichum himantophylli Kab. & Bub. [*C. gloeosporioides* Penz.]: anthracnose, anthracnose: on senescent leaves of 1 BC 52:112.

Cochlearia L.

CRUCIFERAE

Succulent, boreal to arctic, halophytic, mostly biennial herbs.

1. *C. officinalis* L., including *C. groenlandica* L., scurvy grass, cuillère; arctic N. America south to Nfld; also in Eurasia.

Mycosphaerella pyrenaica (Speg.) Arx: on 1 Frank [971].

M. tassiana (de Not.) Johans. (*M. pachyasca* (Rostr.) Vesterg.): on 1 Frank [600].

M. tassiana var. *arctica* (Rostr.) Barr: on 1 Frank [52].

Peronospora parasitica (Pers. ex Fr.) (*P. cochleariae* Gäum.): on 1 Keew [959], Que [605].

Phoma herbarum West. and *P. nebulosa* (Pers.) Mont. in Berk.: on 1 Greenl [900].

Pleospora androsaces Fckl. (*Pyrenophora a.* (Fckl.) Sacc.): on 1 Greenl [603].

Puccinia eutremae Lindr.: III on 1 Greenl [15, p. 291].

Colchicum L.

LILIACEAE

Small cormous plants, mostly blooming in the fall; native to the northern hemisphere of Europe and Asia.

1. *C. autumnale* L., autumn crocus, colchique; native to Europe and N. Africa.

Urocystis colchici (Schlecht.) Rabh.: smut, charbon: on 1 BC 58:114, Ont 34:83, [cf. 292, 963].

Coleus Lour.

LABIATAE

Herbs or small shrubs, native to tropical or subtropical parts of Asia, Africa, Australia and the Pacific Islands; several forms widely cult. in window boxes and greenhouses.

Botrytis cinerea Pers.: on *C. sp.* Alaska [175].

Meloidogyne incognita (Kofoid & White) Chitwood: on plants brought from Ont to Sask 56:123.

Rhizoctonia solani Kühn: cause of a rot of cuttings Ont 59:87.

Virus: yellows, jaunisse: on *C. sp.* NB 35:66, 36:74.

Collinsia Nutt.

SCROPHULARIACEAE

Annual herbs of w. N. America.

1. *C. parviflora* Dougl. ex Lindl.; in Canada in Alta and BC.

Synchytrium sp.: on 1 BC [541].

Collomia Nutt.

POLEMONIACEAE

Annual or biennial herbs of N. America.

1. *C. linearis* Nutt. (*Gilia l.* (Nutt.) Gray); NB and Que, n. Ont to BC; an adventive weed in NS.

Phytophthora parasitica Dastur: on 1 Man [93, p. 31].

Septoria giliae Dearn. & Bisby: on 1 Man [93, p. 138].

Sphaerotheca macularis (Wallr. ex Fr.) Magn. (*S. humuli* (DC.) Burr.): on 1 BC [50].

Uromyces acuminatus Arth. var. *polemonii* (Pk.) Davis: 0 I on 1 Sask [93, p. 72; cf. 15, p. 168].

Colpodium Trin.

GRAMINEAE

Annual or perennial grasses of arctic regions.

1. *C. vahlium* (Lieb.) Nev. (*Glyceria vahliana* Lieb., *Puccinellia v.* (Lieb.) Scribn. & Merr.); Mack, Keew, Que and Greenl.

Lophodermium alpinum Rehm: on 1 Frank [604].

L. arundinaceum (Schrad. ex Fr.) Chev.: on 1 Greenl [899].

Mycosphaerella tassiana (de Not.) Johans. (*Sphaerella t.* de Not.): on 1 Frank [600, 604, 903], Greenl [603, 899].

Platyspora pentamera (Karst.) Wehm. (*Clathrospora p.* (Karst.) Berl.): on 1 Frank Greenl [604].

Comandra L.

SANTALACEAE

Smooth, sometimes parasitic plants of N. America and s.e. Europe.

1. *C. livida* Richards. (*Geocaulon lividum* (Richards.) Fern.); from Labr, Nfld and NS to Sask, Alta, BC and Alaska.
2. *C. pallida* A.DC.; in Canada from Man and Sask to Yukon and BC.
3. *C. richardsiana* Fern.; in Canada from NB and Que to Man.
4. *C. umbellata* (L.) Nutt.; in Canada in Que and Ont.

Cercospora comandrae Ell. & Dearn.: on 2 Man [93, p. 114].

Cronartium comandrae Pk.: II III on 1, 2 BC F52:153, [1198]; on 1 Man Que, 2 BC Alta NWT Sask, 4 Ont Que [15, p. 28]; on 1 Man, 2 Alta Sask Man [93, p. 63]; on 1 Que, 2, 3, 4 Ont [828].

Erysiphe polygoni DC. ex Mérat: on 2 BC [50].

- Puccinia andropogonis* Schw. (*P. a.* var. *pustulata* Arth.): 0 I on 2 and reported on 4 mistakenly for 3 Man [93, p. 65]; on 3, 4 Ont [828]; on 4 Ont [15, p. 122].
P. comandrae Pk.: III on 1 Man, 2 Sask [93, p. 67]; on 2 Alta Sask and reported on 4 mistakenly for 3 PEI [15, p. 124; cf. 1138].

Comptonia L'Her.

MYRICACEAE

Low pubescent shrub, native to N. America.

1. *C. peregrina* (L.) Coult. (*C. asplenifolia* auct. p.p. non L.), sweet fern; in Canada from NS to Man.

Cronartium comptoniae Arth.: II III on 1 Ont Que 34:75, [cf. 15, p. 25; 828].

Erinella rhabdocarpa (Ell.) Sacc.: on 1 NS [1138].

Conioselinum Hoffm.

UMBELLIFERAE

Slender herbaceous perennials of N. America and Eurasia.

1. *C. chinense* (L.) BSP.; from Labr, Nfld and NS to Ont.
2. *C. pacificum* (Wats.) Coult. & Rose (*C. gmelini* (Cham. & Schlecht.) Coult. & Rose, non (DC.) Steud., *C. benthami* (Wats.) Fern.); Alaska to Oregon; also in e. Asia.

Cercospora seleni-gmelini (Sacc. & Scalia) Chupp: on 2 Alaska [175].

Puccinia sp. inedit. (*Aecidium* sp.): 0 I III on 1 Que [8, 197].

P. ligustici Ell. & Ev.: III on 2 Alaska [175; cf. 15, p. 280].

Septoria micropunctata Ell. & Ev.: on 1 Que [197].

S. petroselini Desm. ssp. *trelesiana* Sacc. & Scalia: on C. sp., 2 Alaska [175].

Conringia Lk.

CRUCIFERAE

Glabrous annuals of the Old World.

1. *C. orientalis* (L.) Dumort., hare's ear mustard, vélar d'Orient; a weed occurring in all provinces of Canada and abundant in the Prairie Provinces.

Plasmodiophora brassicae Wor.: heavy on 1 PEI 32:101, [1138].

Convallaria L.

LILIACEAE

Perennial herbs of Eurasia and N. America, prized for the fragrant dainty flowers in spring.

1. *C. majalis* L., lily of the valley, muguet; Eurasia, abundantly spread from cultivation.

Ascochyta majalis Massal. (*Phyllosticta cruenta* (Fr.) Kickx): leaf spot, tache ascochytiq: on 1 Ont; really a *Stagonospora*, 45:110.

Botrytis cinerea Pers.: gray mold, moisissure grise: on 1 BC 59:87, Ont 45:110, Que 55:121, [cf. 963].

Gloeosporium convallariae Allesch.: anthracnose, anthracnose: on 1 Ont 45:110, 47:106.

Phyllosticta convallariae Pers.: leaf spot, tache des feuilles: on 1 Ont 42:99, Que 55:121; but see *Ascochyta majalis*.

Puccinia sessilis Schneid. ex Schroet.: 0 I on 1 NS 38:100, 61:112, [1138; cf. 15, p. 130].

Convolvulus L.

CONVOLVULACEAE

Herbs or somewhat shrubby, twining, erect or prostrate plants, widely distributed in temperate and tropical regions.

1. *C. arvensis* L., field bindweed, vrillée; widespread in Canada except PEI and possibly Nfld, particularly troublesome in the southern prairies and in Ont and Que.
2. *C. sepium* L., hedge bindweed or wild morning glory, gloire du matin; in part native to Canada and in part introduced from Europe.
3. *C. spithameus* L.; a native species, in Canada in Que and Ont.

Leptosphaeria doliolum (Pers.) de Not.: on dead stems of 2 Man [93, p. 54].

Pistillaria micans Pers. ex Fr.: on dead stems of 2 Man [93, p. 79].

Puccinia convolvuli Cast.: 0 I II III on 2 Man [93, p. 67], Ont Que [828], Que [15, p. 254], NS PEI [1138].

Ramularia sepium Dearn. & Bisby: on 2 Ont [93, p. 125].

Septoria convolvuli Desm.: on 1 Sask, 2 Man [93, p. 138]; on 1 BC [535]; on 2 PEI [1138].

S. ?flagellaris Ell. & Ev.: on 2 Man 31:115, [93].

Trinacrium subtile Reiss: on dead stems of 2 Man [93, p. 128].

?Virus: blight, brûlure: on 3 Ont 43:103.

Coptis Salisb.

RANUNCULACEAE

Low smooth perennial herbs of N. America and Asia.

1. *C. asplenifolia* Salisb.; in Alaska and BC.
2. *C. trifolia* var. *groenlandica* (Oeder) Fasset (*C. g.* (Oeder) Fern.), goldthread, savoyane; from Greenl, Labr, Nfld and NS to Man.
3. *C. trifolia* (L.) Salisb. var. *trifolia*; in e. Asia and Alaska.

Eurotium herbariorum (Wigg.) Lk.: on 2 Alaska [175].

Heteropatella umbilicata (Pers. ex Fr.) Jaap (*Septoria cercosperma* Rostr.): on 2 Greenl [899].

Mycosphaerella coptis (Schw.) House: on 2 Que [53]; on 2 NS, conidial state apparently *Septoria coptidis*, q.v., [1138].

Phoma herbarum West.: on 2 Greenl [900].

Phyllosticta helleboricola Massal. var. *coptidis* Sacc. & Scalia: on 3 Alaska [175].

Coptis

Septoria coptidis Berk. & Curt.: on 1 Alaska [175]; on 2 Man [93, p. 138], Que [53], NS [1138].

Vermicularia coptina Pk.: on 2 NS [1138].

Wettsteinina mirabilis (Niessl) Höhn.: on 2 Que [53].

Corallorhiza Chatelain ORCHIDACEAE

Brownish, purplish or yellowish herbs destitute of green foliage, native to the northern hemisphere.

1. *C. maculatum* Raf., spotted coralroot or dragon's claws, corallorhize maculée; in Canada in Nfld and from NS to BC.

Ophiobolus porphyrogonus (Tode) Sacc.: on stems of 1 NS [1138].

Coreopsis L. COMPOSITEAE

Annual or perennial herbs of America, tropical Africa and the Hawaiian Islands; a number cult. in the open garden for their showy flowers.

1. *C. grandiflora* Hogg., native to central and southern US; cult., and becoming naturalized further north.
2. *C. tinctoria* Nutt., tickseed; from Man and s. and w. in the US; generally cult. and often escaped.

Botrytis cinerea Pers.: on *C. sp.* Alaska [175].

Fusarium sp.: reported as the cause of wilt of *C. sp.* BC 36:75.

Sphaerotheca fuliginea (Schlecht. ex Fr.) Poll. (*S. humuli* (DC.) Burr. var. *f.* (Schlecht.) Salm.): on *C. sp.* [50]; on 1 BC 40:91.

Aster yellows virus (callistephus virus 1): aster yellows, jaunisse de l'aster: on *C. sp.* NB 31:90, 33:67, PEI 44:106, 45:111; on 2 NB 47:106. Infection usually light, but affected plants severely damaged NB 48:106.

Cornus L. CORNACEAE

Mostly shrubs or small trees, native to the north temperate zone, or a few to Mexico, the Himalayas and Africa.

1. *C. alba* L., tatarian dogwood; native to Siberia and N. China.
2. *C. alternifolia* L.f., green osier, cornouiller à feuilles alternes; in Canada from Nfld to Ont and Man.
3. *C. canadensis* L., dwarf cornel, quatre-temps; herbaceous plant, occurs from s. Greenl, Labr, Nfld, and NS to Alaska and e. Asia.
4. *C. florida* L., flowering dogwood, bois bouton; in Canada in s. Ont.
5. *C. nuttallii* Audub., flowering dogwood; in Canada on Vancouver I. and the lower Fraser Valley, BC.

6. *C. rugosa* Lam. (*C. circinata* L'Her.), round-leaved dogwood, bois du calumet; in Canada in NS and from Que to Man.

7. *C. sanguinea* L., bloodtwig dogwood, bois pouine; native to Eurasia.

8. *C. stolonifera* Michx. (*C. californica* C.A. Mey., *C. instolonea* A.Nels., *C. occidentalis* (Torr. & Gray) Cov., *C. pubescens* Nutt.), red osier, hart rouge; in Nfld and from NS to Yukon and Alaska.

9. *C. suecica* L.; herbaceous plant, from Greenl, Labr, Nfld and NS to Alaska.

Apioportha corni Wehm. (*Cryptodiaportha c.* (Wehm.) Petrak; stat. conid. *Zythia aurantiaca*, q.v.): on *C. sp.* Ont F59:66; on 2 NS [1138].

Calosphaeria minima Tul.: on 2 NS [1138].

Ceratobasidium anceps (Bres. & Syd.) Jackson: on 3 Ont Que [495].

Conoplea sphaerica (Pers.) Pers.: on *C. sp.* Que [484].

Cryptosporiopsis cornina (Pk.) Petrak & Syd.: on *C. spp.* NS [1138]; on 8 Sask Man [93, p. 132].

Cytospora sp.: associated with a canker on *C. sp.* Que 57:117.

C. pulcherrima Dearn. & Hansbr.: on 8 BC [253].

Diaportha albocarnis Ell. & Ev.: on 8 Man; really a *Leptosphaeria* [93, p. 57].

D. eres Nits.: on branches of 8 Man [93, p. 57].

Didymosphaeria diplospora (Cke.) Rehm: on branches of 8 Man [93, p. 54].

Eutypa milliaria (Fr.) Sacc.: on wood of 2 NS [1138].

Fomes ignarius (L. ex Fr.) Kickx: from 5 BC [791, 1198].

Glomerularia corni Pk.: leaf blight, brûlure des feuilles: on 3 Alaska [175], BC [535], Sask Man [93, 119], Que 33:110, NS [1138].

Hypoderma commune (Fr.) Duby: on 9 Greenl [899].

Lasiosphaeria canescens (Pers.) Karst.: on dead 8 Man [93, p. 51].

Leptosphaeria ?borealis Ell. & Ev.: on twigs of 8 Man [93, p. 54].

L. rugosa Dearn. & Bisby: on dead stems of 8 Man [93].

Leptostroma herbarum (Fr.) Lk.: on 9 Greenl [899].

Lophiostoma ?prominens Pk.: on twigs of 8 Man [93, p. 53].

Merulius confluens Schw. ex Fr.: on 5 BC [1198].

Microsphaera penicillata (Wallr. ex Fr.) Lév. (*M. alni* (Wallr.) Salm.): on 2 Que 33:110.

Mollisia stictella Sacc. & Speg.: on twigs of 2 NS [1138].

Monilinia corni (Reade) Honey: leaf blight, brûlure sclérotique: on 5 BC 34:100, 38:92, common [535].

Mycosphaerella anerswaldii (Fleisch.) Migula: on 5 BC [50].

Myxosporium nitidum Berk. & Curt.: on twigs of 8 Man [93, p. 131].

Odontia crustosa (Pers.) Qué.: on 8 BC [1198].

Ostropa cinerea (Pers.) Fr.: on branches of 8 Man [93, p. 42].

Patellaria clavispora Berk. & Br.: on old 8 Man [93, p. 41].

Peniophora cinerea (Fr.) Cke.: on 5 BC [1198].

Pezicula corni Petrak (stat. conid. *Cryptosporiopsis cornina*, q.v.): on *C. sp.*, 6, 8 Ont [365]; on 6 Ont 33:110; on 8 BC [1198].

Pezicula rubi (Lib.) Niessl (*Dermatea r.* (Lib.) Rehm): on 8 Man [93, p. 40]; almost certainly *P. corni* (q.v.).

Phialea vulgaris (Fr.) Rehm: on *C. sp.* Man [93, p. 41].

Phyllactinia guttata (Fr.) Lév. (*P. corylea* (Pers.) Karst.): on leaves of *C. spp.* BC [50]; on 5 BC 44:99, [1198]; on 8 BC 32:102, [1199], Mack 40:101, Sask Man [93, p. 44].

Phyllosticta corni-canadensis Dearn. & Bisby: on 3 Man [93, p. 135].

Phytophthora cactorum (Leb. & Cohn) Schroet.: crown canker, mildiou de collet: on 5 BC [1198], destructive, 41:82, 52:103.

Pleospora laricina Rehm var. *l.* (*P. pustulans* Ell. & Ev.): on stems of 8 Man [93, p. 55].

Polyporus versicolor L. ex Fr.: from 5 BC [791].

Poria ferrea (Pers.) Bourd. & Galz.: on 5, 8 BC [1198].

Pseudomassaria corni (Sow.) Arx: on *C. sp.* Ont F63:71.

P. foliicola Barr: on overwintered leaves of 3 Que [53, p. 318].

Puccinia porphyrogenita Curt.: III on 3, 9 Alaska [175]; on 3 Alaska BC Sask NS Nfld [15, p. 251], Alaska [1038], BC [1198], Sask Man [93, p. 70], Ont [828], Que 33:110, [197], NS PEI [1138], PEI 34:100.

Radulum orbiculare Fr.: on 8 BC [1198].

Rosellinia mammiformis (Pers.) Sacc.: on old 8 Man [93, p. 51].

Septoria canadensis Pk.: on 3 Alaska [1038], Man [93, p. 137], Que [52], NS [1138].

S. cornicola Desm.: leaf spot, tache septorienne: on 1 cult., Man 43:95, Ont 56:118, on 2 NS 52:103, on 8 Sask Man [93, p. 138]; reported on 3 but probably *S. canadensis* (q.v.) [1138].

Tremella lutescens (Pers.) Fr.: on 2 NS [1138].

Valsa ambiens (Pers. ex Fr.) Fr.: on 8 Man [93, p. 57].

V. cornina Pk.: on branches of 8 Sask Man [93, p. 58].

V. coronata (Hoff.) Fr.: on twigs of 8 Man [93].

V. fallax Nits.: on 3 Alaska [1038].

Venturia clintonii Pk.: on 3 Alaska [1038].

Zythia aurantiaca (Pk.) Sacc.: on dead limbs of 2 NS [1138].

Dogwood mosaic virus: on 5 BC 44:99; on 8 NS 38:92.

Winter injury: caused by a severe freeze in 1955, still affecting 5 cult. BC 57:117, 58:110.

Corydalis Medic.

FUMARIACEAE

Annual or perennial herbs of the north temperate zone and S. Africa, a few cult. in gardens.

1. *C. aurea* Willd., golden corydalis, corydale dorée; occurs from e. Que to Alaska.

2. *C. sempervirens* (L.) Pers. (*C. glauca* Pursh), pale corydalis, corydale toujours verte; from Nfld and NS to BC and Alaska.

Peronospora corydalis de Bary: on 1 Man, 2 Man Ont [93, p. 30].

Corylus L.

CORYLACEAE

Shrubs or small trees of N. America, Europe and Asia, some species cult. for the edible nuts or for ornament.

1. *C. americana* Walt.; American hazelnut, noisetier; from E. Canada to Man.

2. *C. avellana* L., European filbert, aveline; native to Europe, cult. to some extent in BC.

3. *C. cornuta* Marsh. (*C. rostrata* Ait.), beaked hazelnut, noisetier; in Canada from Nfld to BC. 3a, *C. c.* var. *californica* (A.DC.) Sharp (*C. californica* (A.DC.) Rose); from Calif to BC.

Apioportha anomala (Pk.) Höhn. (*Cryptosporella a.* (Pk.) Sacc.): on *C. sp.* Man [93, p. 58], Ont 31:120; on 3 NS [1138].

Botrytis cinerea Pers.: on fruits of 1 Man [93, p. 113].

Catinula turgida (Fr.) Desm.: on branches of *C. sp.* Man [93, p. 132]; on 3 NS [1138].

Cenangium fuckelii Sacc.: on 3 NS [1138].

C. furfuraceum (Roth ex Fr.) de Not.: on dead branches of *C. sp.* Man [93, p. 39].

Ceratobasidium anceps (Bres. & Syd.) Jackson: on 3 Ont [495].

Conoplea fusca Pers. (*Streptothrix f.* Cda.): on dead twigs of *C. sp.* Ont [93, p. 127].

C. geniculata (Cda.) Hughes and *C. sphaerica* (Pers.) Pers.: on *C. sp.* Ont [484].

Cryptospora suffusa (Fr.) Tul. var. *nuda* Pk.: on 3 NS [1138].

Cyphella fasciculata (Schw.) Berk. & Curt.: on old *C. sp.* Man [93, p. 76].

Diaporthe anisomera Sacc. & Scalia: on ?*C. sp.* Alaska; probably an *Apioportha* [175].

D. decedens (Fr.) Fckl.: on *C. sp.* Ont F63:69; on 3 NS [1138].

Diatrype albo-pruinosa (Schw.) Cke.: on branches of *C. spp.* Man, 3 Sask [93, p. 58].

Diatrypella frostii Pk.: on branches of *C. sp.* Man [93, p. 59].

D. missouriensis Ell. & Ev.: on branches of *C. sp.* Man [93], Ont 31:115.

D. verrucaeformis (Ehr.) Nits.: on *C. sp.* Ont F59:66.

Diplodina macrospora Ell. & Ev.: on 3 Ont 33:110.

Gloeosporium coryli (Desm.) Sacc. (*Labrella c.* Sacc. [*Monostichella c.* (Desm.) Höhn.]): leaf spot, anthracnose: on *C. sp.* Que 31:120; on 1 NS [1138]; on 3 BC 42:92, [535], Man [93, p. 130], Ont 43:95, NS 52:103.

Gnomoniella coryli (Batsch ex Fr.) Sacc. [*Mamiania c.* (Fr.) Ces. & de Not.]: leaf spot, tache ponctuée: on *C. spp.* BC [50], Ont F59:66; on 1 Man, 3 Sask Man [93, p. 56]; on 1 Que 32:102, NB 33:110; on 3 NS 43:96; on 3a BC [1198], [cf. 1138].

G. coryli var. *circinata* Dearn. & Bisby: on 3 Man [93, p. 56].

Helicogloea pinicola (Bourd. & Galz.) Baker: on wood of 3 Ont [45].

Hymenochaete corrugata (Fr.) Lév.: on branches of *C. sp.* Man [93, p. 77].

Hypoxylon fuscum (Pers.) Fr.: on *C. sp.* BC [1198], Man [93, p. 59]; on 3 NS [1138].

H. rubiginosum (Pers. ex Fr.) Fr.: on 3a BC [1198].

Lenzites betulina (L. ex Fr.) Fr.: on *C. sp.* NS [1138].

Melanomma pulvis-pyrius (Pers.) Fckl.: on 3a BC [50, 1198].

Metasphaeria corylina Ell. & Holw.: on bark of *C. sp.* Man [93, p. 54].

Corylus

- Nectria episphaeria* Tode ex Fr.: on *C. sp.* BC [1198].
N. galligena Bres.: on *C. sp.* NS [1138].
N. ?rubicarpa Cke.: on *C. sp.* Man [93, p. 46].
Odontia corrugata (Fr.) Bourd. & Galz.: on *C. sp.* BC [1198].
O. crustosa (Pers.) Quél.: on *C. sp.* BC [1198]; see *Abies*.
Peniophora cinerea (Fr.) Cke.: on 3a BC [1198].
P. cremea (Bres.) Sacc. & Syd.: on *C. sp.* BC [1198].
Pezicula corylina Groves (stat. conid. *Catenula turgida*, q.v.): on 3 Ont [363].
Phomopsis revellens Höhn.: canker, chancre: on 2 BC 39:97.
Phyllactinia guttata (Fr.) Lév. (*P. corylea* (Pers.) Karst.): powdery mildew, blanc: on *C. sp.* BC [50]; on 1 Que 32:102; on 3 Man [93, p. 44], Ont 44:99, NS 52:103, on 3a BC [535], [cf. 1138].
Phytoptus avellanae Nalepa (*Eriophyes a.*): filbert bud mite: cause of catkin deformation on 2 BC 49:95, 51:104.
Pleospora herbarum (Fr.) Rabh.: from *C. sp.* Ont [1140].
Polyporus elegans Bull. ex Fr.: recorded on *C. sp.* BC [1198].
P. radiatus Sow. ex Fr.: on *C. sp.* NB NS [1138].
P. semipileatus Pk.: on *C. sp.* BC [1198].
Poria ferrea (Pers.) Bourd. & Galz.: on *C. sp.* BC [1198].
Radulum owensii Lloyd: on *C. sp.* BC [1198].
Septoria corylina Pk.: leaf spot, tache septorienne: on *C. sp.* Que 31:120; on 1 Man [93, p. 138], severe 43:96; on 3 NS [1138]; on 3a BC [535, 1203].
Solenia anomala (Pers.) Fckl.: on old *C. sp.* Man [93, p. 78].
Sphaeropsis coryli Ell. & Ev.: on branches of *C. sp.* Man [93, p. 140].
Stereum hirsutum (Willd. ex Fr.) S.F.Gray: on 3 NS [1138].
Tubercularia vulgaris Tode: on *C. sp.* BC [1198]; on 1 Alta 33:110.
Valsa ambiens (Pers. ex Fr.) Fr.: on branches of *C. sp.* Man [93, p. 57].
V. Pleucostomoides Pk.: on branches of *C. sp.* Man [93, p. 58].
Xanthomonas coryli P. W. Miller et al.: bacterial blight, brûlure bactérienne: on 2 BC [535].

Cosmos Cav.

COMPOSITAE

Showy annuals or perennials of the warmer parts of N. and S. America, some cult. for ornament.

1. *C. bipinnatus* Cav.; native to Mexico; spread from cult. in s.w. US.

- Botrytis cinerea* Pers.: gray mold, moisissure grise: on *C. sp.* BC 47:106, NB 60:68, NS 40:91, [1138].
Fusarium oxysporum Schlecht.: from diseased basal parts of wilted 1 Man [335].
Sclerotinia sclerotiorum (Lib.) de Bary: cause of stem rot of 1 BC [535].
Aster yellows virus (callistephus virus 1): aster yellows, jaunisse de l'aster: on *C. sp.* Sask 34:83, 55:121, Man 57:124, NB 45:111, PEI 42:99.

Cotinus Duham.

ANACARDIACEAE

Shrubs or small trees, one of e. N. America and another of Asia and s. Europe.

1. *C. coggygria* Scop. (*Rhus cotinus* L.), smoke tree, arbre à perruque; Eurasia.

Botrytis cinerea Pers.: on 1 NS [1138].

Pseudomonas syringae van Hall: on 1 NS [1138].

Verticillium spp.: wilt, flétrissure: isolated from twigs from affected 1 Ont 41:82.

Cotoneaster B.Ehrh.

ROSACEAE

Mainly deciduous or evergreen shrubs native to the temperate regions of Europe, N. Africa and Asia except Japan. Ornamental shrubs much planted for their attractive fruits.

1. *C. acutifolia* Turcz., cotoneaster, cotonière; native to n. China.
2. *C. franchetii* Bois.; native to w. China.
3. *C. frigida* Lindl.; native to the Himalayas.
4. *C. lucida* Schlecht.; native to the Altai Mts.
5. *C. horizontalis* Decne.; native to China.
6. *C. melanocarpa* Lodd.; native to Eurasia.

Cucurbitaria elongata (Fr.) Grev.: on stems of *C. sp.* Man [93, p. 51].

Cytospora ambiens Sacc.: on twigs of *C. sp.* BC 39:102.

?*Erwinia amylovora* (Burr.) Winslow et al.: fire blight, brûlure bactérienne: suspected cause of a dieback of *C. sp.* Man, but attempts to isolate the organism were unsuccessful, 43:96.

Gymnosporangium clavipes (Cke. & Pk.) Cke. & Pk.: quince rust, rouille du cognassier: 0 I on fruits of 1 Man 49:95, and/or 4 Man [143].

Nectria cinnabarina Tode ex Fr.: on 3 BC [535].

Phyllosticta sanguinea Sacc.: leaf spot, tache foliaire: on 1 Que 61:103; on 6 Man 44:99; ? on 1 Que 57:117.

Phytophthora cactorum (Leb. & Cohn) Schroet.: dark berry, baie noire: on 2 BC 41:89; on 5, common, BC 38:100 et seq.; oospores abundant in infected fruits BC 50:114.

Polyporus tulipiferae (Schw.) Overh.: white spongy rot, carie blanche spongieuse: associated with dieback of *C. sp.* Man 43:96.

Crataegus L.

ROSACEAE

Small trees or shrubs of the northern hemisphere, most abundant in n.e. and central N. America; sometimes planted for ornament.

1. *C. calopodendron* (Ehr.) Medic. (*C. tomentosa* auct. non L.); in Canada in s. Ont.
2. *C. chrysoarpa* Ashe, hawthorn, cenelles; in Canada in Nfld and from Que to Man and Alta. 2a, *C.c.* var. *phoenica* Palmer (*C. rotundifolia* Moench non Lam.); in s.e. Canada.

3. *C. columbiana* Howell; Wash, Oregon and Idaho.
4. *C. douglasii* Lindl. (*C. brevispina* (Dougl.) Heller); in Canada in Alta and BC.
5. *C. macrantha* Lodd. (*C. glandulosa* Moench); in s.e. Canada.
6. *C. macrosperma* Ashe, in s. and E. Canada.
7. *C. monogyna* Jacq., closely related to 8, native to Europe, n. Africa and s.w. Asia.
8. *C. oxyacantha* L., English hawthorn, aubépine; native to Europe and n. Africa; long cult.; including 8a, *C. o.* var. *paulii* Rehd. (f. *splendens* Schneid.), flowers double, scarlet; and 8b, *C. o.* var. *rosea* Willd., flowers rose.
9. *C. pedicellata* Sarg. (*C. coccinea* auct., non L.); in Canada in Ont.
10. *C. pinnatifida* Bunge; native to s.e. Asia; cult. in China for its edible fruits.
11. *C. succulenta* Lk.; in s.e. Canada and some varieties to Man.

Other hosts: 12, *C. beata* Sarg. 13, *C. caesia* [*C. ?caesa* Sarg.]. 14, *C. colorata* Sarg. 15, *C. crus-galli* L. 16, *C. delicatilis* [*C. ?delectabilis* Sarg.]. 17, *C. floribunda* C.Koch [*C. coccinea* L.]. 18, *C. fucosa* Sarg. 19, *C. pinnatifida* Lange. 20, *C. punctata* Jacq. 21, *C. sanguinea* (Pursh) DC.

- Botryosphaeria obtusa* (Schw.) Shoem.: the conidial state on 19 Ont [996].
- Botrytis cinerea* Pers.: gray mold, moisissure grise: heavy on blossoms of 8 NS 51:105.
- Cercoseptoria crataegi* (Ell. & Ev.) Davis: leaf spot, tache cercoseptorienne: on 6 NS 51:105.
- Conoplea sphaerica* (Pers.) Pers.: on *C. sp.* Ont [484].
- Corticium contiguum* Karst. (*C. crustaceum* (Karst.) Höhn. & Litsch.): on *C. sp.* Man [93, p. 75].
- Cylindrosporium brevispina* Dearn. [sic]: on 4 BC 24:72, [535].
- Cytospora pulcherrima* Dearn. & Hansbr.: on 4 BC [253, p. 127].
- Diaporthe crataegi* (Currey) Nits.: on branches of 2 Sask [93, p. 57].
- D. eres* Nits.: on *C. sp.* Ont F60:66.
- Diatrype albopruinosa* (Schw.) Cke.: occasionally on *C. sp.* Man [93, p. 58].
- D. stigma* Hoffm. ex Fr.: on *C. sp.* Man [93, p. 59].
- Diatrypella quercina* (Pers.) Nits.: on *C. sp.* Man [93].
- Dictydiaethalium plumbeum* (Schum.) Rost.: on *C. sp.* Man [93, p. 25].
- Durandiella lenticellicola* Groves: on *C. sp.*, type, Maple, Ont; on *C. spp.* Ont Que NS [373, p. 133].
- Entomosporium thuemenii* Sacc. (?*E. maculatum* Lévl.): leaf blight, brûlure entomosporienne: on *C. sp.* Que 40:91; on 8 BC 47:101, Ont NS 38:100, NB 40:91, [1138]; on 8a BC 41:82; 8b more susceptible than white forms NS 51:105; 54:122. Often severe, causing premature defoliation.
- Erwinia amylovora* (Burr.) Winslow et al.: fire blight, brûlure bactérienne: on *C. spp.* Ont 38:73; on *C.*

- sp.* Alta F62:101; on 8 BC 32:83; on 8b PEI 30:79; on 10 Man 41:89.
- Fenestella phaeospora* Sacc.: on branches of *C. sp.* Man [93, p. 57].
- Fomes conchatus* (Pers. ex Fr.) Gill.: cause of a white rot of broad-leaved trees: from *C. sp.* Que; for characters in culture see Nobles [791].
- Gymnosporangium betheli* Kern: 0 I on *C. sp.* Man, 2 Sask [93, p. 64]; on 2a, 11 Man 43:96; on 3 BC [1199]; on 4 BC [15, p. 374].
- G. clavariiforme* (Pers.) DC.: 0 I on 2 Sask 30:95, [93, p. 64]; on 8 BC 41:89, 49:95, Ont [828], NS 51:105; on 8b NS 56:119, PEI 30:79, [cf. 15, p. 373; 1138].
- G. clavipes* (Cke. & Pk.) Cke. & Pk.: quince rust, rouille du cognassier: 0 I on *C. spp.* Sask 34:100, Man [93, p. 64], Ont 31:120, Que 33:111, PEI [1138]; on 3 BC [1198]; on 7, 8, 11, 12, 13, 18, 20 Ont [828]; on 8 NS 37:68; on 20 [15, p. 363]. Common on fruits and less so on new shoots of *C. spp.*
- G. globosum* Farl.: hawthorn rust, rouille de l'aubépine: 0 I on *C. sp.* Ont 24:49, Que 33:111, ?Sask [93, p. 64]; on 1 Ont Que, 9, 20 Ont [15, p. 375]; on 2a, 8, 13, 14, 16, 17, 18, 21 Ont [828]; on 5 Ont 55:115.
- G. tubulatum* Kern ex Arth.: 0 I on *C. sp.* BC 44:99; on 4 BC [1198; cf. 15, p. 375].
- Monilinia johnsonii* (Ell. & Ev.) Honey: on 6 NS 52:103.
- Myriangium asterinosporum* (Ell. & Ev.) Miller: on Coccidae on *C. sp.* London, Ont [727, p. 596].
- Pezicula crataegicola* (Durand) Groves: on *C. sp.* London, Ont [370, p. 414; 979].
- Phyllactinia guttata* (Fr.) Lévl. (*P. corylea* (Pers.) Karst.): powdery mildew, blanc: on *C. sp.* BC [50].
- Phyllosticta crataegi* (Cke.) Sacc.: on *C. sp.* Man [93, p. 135].
- Podosphaeria clandestina* (Wallr. ex Fr.) Lévl. (*P. oxyacanthae* (DC.) de Bary: powdery mildew, blanc: on *C. sp.* Alta 37:68, Que 56:119, PEI 34:85; on 6 NS 53:106; on 8 BC [535]; on 11 Man 53:96; on 15 cult. Que F60:44.
- Polyporus hirsutus* Wulf. ex Fr.: from *C. sp.* Ont [791].
- Poria ferrea* (Pers.) Bourd. & Galz.: on *C. sp.* BC [1198].
- Schizoxylon compositum* Ell. & Ev.: on branches of *C. sp.* Man [93, p. 42].
- Stereum purpureum* (Pers. ex Fr.) Fr.: on *C. sp.* NB F53:26.
- Thyridium ?canadense* Ell. & Ev.: on old branches of *C. sp.* Man [93, p. 57].
- Valsa ambiens* (Pers. ex Fr.) Fr.: on *C. sp.* Man [93].
- V. ceratosperma* (Tode ex Fr.) Maire: on *C. sp.* NS F62:37.
- V. leucostoma* (Pers.) Fr.: on *C. sp.* Man [93, p. 58].

Crepis L.

COMPOSITAE

Annual, biennial or perennial herbs mostly of the northern hemisphere; a few introduced species are weeds.

Hosts: 1, *C. atribarba* Heller (*C. angustata* Rydb.). 2, *C. pygmaea* L. 3, *C. runcinata* (James) Rydb. (*C. glauca* Rydb.).

Mycosphaerella tassiana (de Not.) Johans.: on 1 BC [50].

Crepis

Pleospora herbarum (Fr.) Rabh.: on 2 Alaska [175, 604].

Puccinia dioicae (P. Magn.) (*P. extensicola* Plowr. var. *hieraciata* Arth.): 0 I on *C. sp.*, 3 Sask [93, p. 68; cf. 15, p. 199].

P. hieracii Martius: 0 I II III on 1 BC [15, p. 352]; on 3 Sask [93, p. 69].

Crocus L.

IRIDACEAE

Cormous herbs native to the Mediterranean region and s.w. Asia; a few widely cult.

Botrytis cinerea Pers.: gray mold, moisissure grise: cause of bulb rot of *C. sp.* BC 42:99, and blight BC 47:106.

Cryptogramma R.Br. POLYPODIACEAE

Low ferns of cool regions of the northern hemisphere.

1. *C. acrostichoides* R.Br. (*C. crispa* (L.) R.Br. var. *acrostichoides* (R.Br.) C.B. Clarke), mountain parsley; locally in Ont, and from Keew to Alaska and s.e. Asia.

2. *C. stelleri* (Gmel.) Prantl; in Labr and Nfld and from NB to Alaska.

Hyalopsora cheilanthis Arth.: II III on 2 Ont [828], Que [197; cf. 15, p. 11].

Milesia darkeri Faull: II III on 1 BC [15, p. 9].

Cryptotaenia DC. UMBELLIFERAE

Glabrous perennial of N. America, Eurasia and Africa.

1. *C. canadensis* (L.) DC., honewort, cerfeuil sauvage; in Canada from NB to Man.

Puccinia cryptotaeniae Pk.: 0 III on 1 Ont [828], Canada [15, p. 321].

P. microica Ell.: I III on 1 Que [15, p. 321].

Cucumis L. CUCURBITACEAE

Annual or perennial, trailing or climbing plants native mostly to Africa; a few grown for their edible or ornamental fruits.

1. *C. melo* L., melon or muskmelon, melon; probably native to central Asia; also *C. m.* var. *cantalupensis* Naud., cantaloupe, cantaloupe. Named from a center in Italy noted for this variety of melons.

2. *C. sativus* L., cucumber, concomb; native to s. Asia.

Alternaria sp.: leaf spot, tache des feuilles: the organism on 2 appears to be distinct from *A. cucumerina* (q.v.) on 1 and approaches *A. tenuis*, 48:42; BC 41:34, Ont 40:34, NB 48:42, NS 50:54, PEI 36:25. The disease is sometimes severe NB 61:67, especially where rotation is not practiced, NS 51:48.

A. cucumerina (Ell. & Ev.) J.A. Elliott (*Macrosporium cucumerinum* Ell. & Ev.): leaf spot, tache alternarienne: on 1 BC 53:61, Ont 38:35, 46:39, Que 36:36, NB 37:28. Zineb and maneb control the disease Ont 61:70.

Ascochyta cucumeris Fautr. & Roum.: on 2 BC [535].

Botrytis cinerea Pers.: gray mold, moisissure grise: On *C. sp.* Alaska [175]; on 2 BC 36:25, Ont 45:52, NB 37:27, NS 56:58. Cause of a destructive stem rot of 2 under glass Ont 47:48, particularly in cloudy cool weather, 56:58; however, periodic spraying with ferbam prevented severe outbreaks Ont 49:45, [cf. 697].

Cladosporium cucumerinum Ell. & Arth.: scab, gale: on 1 Ont 39:42, Que 54:67, NB 36:26; when epidemic the damage may be severe Ont 40:37; on 2 Man 24:35, Ont Que NS 25:44, NB 29:28, PEI 33:25. Severe outbreaks on 2 are not uncommon in both the greenhouse and field Ont 42:44, Que 29:28, NB 30:41, NS 32:38. Growing of resistant cultivars such as Maine #2, NB 50:34, NS 53:59, PEI 51:48, and Highmoor, NB 61:68, PEI 56:58, has brought some relief; spraying may be of some value NB 53:59.

Colletotrichum orbiculare (Berk. & Mont.) Arx (*C. lagenarium* (Pass.) Ell. & Halst.): anthracnose, anthracnose: on 1 Ont 37:28, Que 44:47; on 1 var. *flexuosus* Naud., snake melon, Que 42:46. Often destructive, necessitating seed treatment and regular spraying with zineb for control Ont 58:58; on 2 Ont 25:44, 40:34, Que 60:73, NB 22:55, NS 24:35, PEI 26:23. With *Pythium aphanidermatum* (Edson) Fitzp., it affected 25 percent of the fruits in a carload of 2 on examination in Montreal, 51:49. Much less prevalent on 2 than scab; apparently only physiologically distinct from *Gloeosporium fructigenum* Berk.

Cuscuta sp.: dodder, cuscute: on 2 NB 61:68.

Erwinia carotovora (L.R. Jones) Holland: soft rot, pourriture molle: on fruit of 1 PEI 42:46.

E. tracheiphila (E.F. Sm.) Holland: bacterial wilt, flétrissure bactérienne: on 1 Man 23:79, Ont 29:30, Que 36:26; on 2 Alta 25:45, Man 40:34, Ont 20:40, Que 22:55, NB 26:23, NS 45:53. Often reported on 1, but damage usually slight; losses on 2 are seldom heavy when the vines are kept well protected against cucumber beetles Ont 46:38, Que 35:28. This confirms experimental evidence that the striped cucumber beetle, *Acalymma vittata* (Fabr.), and the spotted cucumber beetle, *Diabrotica undecimpunctata howardii* Barber, are important vectors. The former is the more widely distributed in Canada.

Erysiphe cichoracearum DC. ex Mérat: powdery mildew, blanc: on 1 Ont Que 53:61. Sometimes epidemic since its appearance on 1 in 1945, and early applications of Karathane are necessary for good control Ont 57:61; Zucca melons appear to be very susceptible Ont 56:61. On 2 BC 51:49, Ont 44:45, Que 53:59, 55:61, NB 33:25, NS 57:58; mainly destructive to greenhouse crops of 2 Ont 49:45, but sometimes in the field, 58:58. Karathane (dinitrocaprylphenyl crotonate) has been used successfully in the greenhouse Ont 54:64, but such use has not been officially approved [cf. 730]. Possibly the fungus is in part *E. polyphaga* Hammarlund, 48:105.

Fungi from seed: of 1: *Alternaria tenuis* acut. sensu Wiltshire, *Botrytis cinerea* Pers., Calif; *Chaetomium cochliodes* Pall., NJ; *C. globosum* Kze., Mich; *Cunninghamella elegans* Lendner, Conn [374]. *Fusarium equiseti* (Cda.) Sacc., *F. oxysporum* Schlecht., *F. sambucinum* Fckl., Calif [334]. *Oospora lactis* Fres., *Papularia arundinis* (Cda.) Fr., *Petriella*

asymmetrica Curzi, Calif [374]. Of 2: *Alternaria consortialis* (Thüm.) Groves & Hughes, Pa; *Botrytis cinerea*, BC Conn; *Chaetomium aureum* Chivers, C. *funicola* Cke., Mich; C. *globosum*, Que; C. *murorum* Cda., BC; *Cladosporium cladosporioides* (Fres.) De Vries, Conn; *Cunninghamella echinulata* Thaxt., C. *elegans*, Minn; *Epicoccum nigrum* Lk., Calif [374]. *Fusarium oxysporum*, BC Nebr [334]. *Mycosphaerella citrullina* (C.O.Sm.) Gross., *Oospora lactis*, Ont; *Paecilomyces varioti* Bain., Minn; *Papularia sphaerosperma* (Pers.) Höhn., BC; *Penicillium roseopurpureum* Dierckx, NJ; *Petriella asymmetrica* Curzi, BC; *Rhizoctonia solani* Kühn, Calif; *Sordaria fimicola* (Rob.) Ces. & de Not., Que; *Verticillium albo-atrum* Reinke & Berth., Minn [374].

Fusarium oxysporum Schlecht. f. *melonis* Snyder & Hansen (F. *bulbigenum* Cke. & Massee var. *niveum* (E.F.Sm.) Wr. p.p.): wilt, flétrissure fusarienne: on 1 BC 34:64, 46:39, Sask 49:48, Man 38:35, Ont 37:28, 45:55, [335]. This destructive disease of 1 has limited the areas in s.w. Ont where the crop may be profitably grown, 56:61. Isolates from 1 were capable of attacking *Citrullus vulgaris* (q.v.) and vice versa, but any isolate was more virulent on its original host than on the other [694]. A detailed study of the pathogen by Miller [729, 730, 731, 732] showed that fresh isolates were mostly of the wild type, but that the fungus mutated rapidly and the mutations were usually less pathogenic than the original isolate. However, cultures of the wild types may be maintained in soil. The occurrence and distribution of wilt on 1 and *Citrullus vulgaris* in Ont have been reported by Reid [870, 871], who also described the effect of environment on the host-parasite relations and the etiology of the disease.

F. spp.: from basal parts of wilted plants of 1: F. *acuminatum* Ell. & Ev., F. *oxysporum*, F. o. var. *redolens* (Wr.) Gordon, F. *semitectum* Berk. & Rav., F. *solani* (Mart.) App. & Wr., Man [335]; from fruits: F. *equiseti*, F. *sambucinum*, Man 38:35.

F. spp.: often recorded as the cause of wilt of 2: BC 47:49, Alta 49:45, Sask 52:48, Man 38:33, Ont 20:40, Que 34:33, NS 54:65, PEI 36:24. Species recorded are: F. *acuminatum*, F. *equiseti*, F. *solani*, Man 41:34; F. *equiseti*, NS, F. *oxysporum*, BC Alta, also F. *poae* (Pk.) Wr. and F. *oxysporum* var. *redolens* from diseased plants, Man [335]. In certain cases the primary cause may have been drought Man 20:40, or fertilizer injury NS 34:65.

F. spp.: also recorded as the cause of fruit rot of 2 NS 36:25; F. *acuminatum* and particularly F. *equiseti* caused extensive damage to stored fruits for pickling in 1933 Man [335].

Meloidogyne sp. (*Heterodera radiculicola* (Greef) Muell.): root-knot nematode, nodosité des racines: on 2 in greenhouse BC 44:45, Ont 25:44.

Mycosphaerella citrullina (C.O.Sm.) Gross. (M. *melonis* (Pass.) Chiu & Walker; stat. conid. *Ascochyta citrullina* (Chester) C.O.Sm.): stem blight, pourriture noire: on 2 Alta 41:35, Ont 46:38, Que 56:69; primarily a greenhouse disease of mature plants, but once destructive to young plants Ont 50:55. Most of these records may actually refer to *Phomopsis cucurbitae* (q.v.), because McKen [701] encountered M. *citrullina* only once in Ont.

Phomopsis cucurbitae McKen: black rot, pourriture noire: on 1, 2 in one or more greenhouses, Ont. Etiology of the disease was described [701], cf. 52:48, 55:61, 56:59.

Pseudomonas lachrymans (Sm. & Bryan) Carsner: angular leaf spot, tache angulaire: on 2 BC 57:58, Alta 36:25, Sask 45:53, Man 24:25, Ont 44:45, Que NB 28:61, NS 61:68; widespread but rarely destructive except in sprinkler-irrigated fields Alta 52:49.

Pseudoperonospora cubensis (Berk. & Curt.) Rostow: downy mildew, mildiou; on 1 Man 23:80; on 2 Ont 49:45, Que 25:44.

Pythium spp., including P. *irregulare* Buism. and P. *ultimum* Trow: damping-off, fonte des semis: on 1 BC 44:48, Sask 50:59, Ont 52:51; on 2 Ont 47:49, NB 32:38, PEI 49:45. May be destructive on 2 both in the greenhouse and in the field during cold, cloudy weather Ont 56:59.

P. spp., including P. *ultimum*: cause of a fruit rot of 1 BC 41:36, 45:55; of 2 BC 40:35, Man 38:33.

Rhizoctonia solani Kühn: foot rot, pourriture du pied: on 2 Sask PEI 26:23, Que 41:34.

Sclerotinia sclerotiorum (Lib.) de Bary (S. *libertiana* Fckl.): stem or fruit rot, pourriture sclérotique: on fruits of 1 NB 36:26; on 2 BC 36:25, Alta 37:27, Man [93, p. 42], Ont 25:44, PEI 24:35. Occasionally destructive in greenhouse Ont 42:45, but may be arrested by ferbam, 51:49.

Septoria cucurbitacearum Sacc.: leaf spot, tache septorienne: on 1 Ont 40:37.

Trichothecium roseum (Pers.) Lk.: foliage rot, moisissure rose: on 2 under glass in Ont in 1951 [699].

Verticillium spp.: wilt, flétrissure verticillienne: on 1 BC 50:59, 52:51; on 2 BC 49:46, 51:49, Ont 38:33, NB 58:57, NS 57:58; rare on 2.

V. *albo-atrum* Reinke & Berth.: from affected 1 Ont [690].

Aster yellows virus (callistephus virus 1): aster yellows, jaunisse de l'aster: destructive to 2 Sask 57:59.

Beet curly-top virus: curly top, frisolée de la betterave: on 1 BC 41:37.

Cucumber mosaic virus (cucumis virus 1): cucumber mosaic, mosaïque du concombre: on 1 BC 43:52, Ont 39:42, Que 47:52; on 2 BC 41:35, Alta 34:34, Sask 54:65, Man Ont Que NB PEI 24:35, NS 53:59; also reported on Chinese preserving melon, *Benicasa hispida* Cogn., snake gourd, *Trichosanthes anguina*, and lemon-cucumber melon, 1 var. *chito* Naud., Que 42:47. High incidence in 1, 2 and other cucurbits was associated with large populations of the melon or cotton aphid, *Aphis gossypii* Glover, Ont 51:52, 58:57. Losses may be heavy, 42:45, 46:38, 58:59. The Burpee hybrid cucumber, which formerly showed resistance to CMV, exhibited little resistance to local strains from 1952 onward Ont 52:49. An atypical strain of CMV has been isolated from *Prunus*, in which it seems to be latent [1175].

Cucumber necrosis virus: necrotic leaf spot, tache nécrotique: on 2 in greenhouse in Ont [702], first noted in 1952, 54:65, 57:59.

Tomato ringspot virus, strain: ring spot, tache angulaire: on 2 in greenhouse Ont 57:59.

Chemical injury from pesticides: on 1 Ont 56:61; on 2 BC 61:68, Sask 52:49, Ont 58:55, 57, NB 57:59, NS 53:59.

Low-temperature injury: cause of cold pox on 2 Ont 54:65, 55:62; from frost PEI 44:46.

High-temperature injury: on 2 Sask 59:48, NB 35:25.

Potassium deficiency: carence de potasse: on 2 Ont 45:53.

Cucurbita L.

CUCURBITACEAE

Coarse long-running annuals or perennials, all supposedly native to the New World.

1. C. *maxima* Duchesne, autumn or winter squash, potiron hivernale. 1a, C. m. var. *turbaniformis* Alef., turban squash.

Cucurbita

2. *C. pepo* L., pumpkin, citrouille; also 2a, vegetable marrow, courge à moelle; and rarely 2b, summer squash, pâtisson. Probably some of the records under 1 belong under 2b.

Alternaria sp.: associated with a leaf spot of 1 Alta 36:39; of 2a BC 45:85.

A. sp. followed by *Fusarium acuminatum* Ell. & Ev.: cause of storage rot of 1 Man 38:56.

A. cucumerina (Ell. & Ev.) J.A.Elliott: alternaria spot, tache alternarienne: cause of a fruit spot of 1 in storage NS 53:80.

Ascochyta cucumeris Fautr. & Roum.: leaf spot, tache ascochytiq: on 2a BC 43:79, 47:82.

Botrytis cinerea Pers.: gray mold, moisissure grise: on fruits of 1 in storage NB 43:71, NS 34:46, and along with *Alternaria* sp. (q.v.) and *Phoma* sp. on 1 Que 54:93.

Cladosporium cucumerinum Ell. & Arth.: scab, gale: on fruits of 1 NS 58:76.

Colletotrichum coccodes (Wallr.) Hughes (*C. atramentarium* (Berk. & Br.) Taub.: on fruits of 1 NS 58:76.

C. orbiculare (Berk. & Mont.) Arx (*C. lagenarium* (Pass.) Ell. & Halst.): on leaves of 1 NS 55:87.

Erwinia tracheiphila (E.F.Sm.) Holland: bacterial wilt, flétrissure bactérienne: on 1 Ont NS 41:53, Que 42:64, NS 50:84; on 2a NS 34:52, 44:80; on 2b Ont 31:52, 35:59; rarely severe on *Cucurbita* spp.

Erysiphe cichoracearum DC. ex Mérat: powdery mildew, blanc: on 1 BC 37:41, Ont 49:69; on 2 BC 40:51, Ont 53:79, Que 38:54, NB 33:34; on 2a BC 34:52. Occasionally severe on 1, causing premature defoliation late in the season Ont 57:83. Possibly *E. polyphaga* Hammarlund occurs on 2 BC Que NB 48:105.

Fungi from seed: *Alternaria consortialis* (Thüm) Groves & Hughes, 2 Nebr; *A. tenuis* auct. sensu Wiltshire, 1 Man, 2, 2a BC; *Aspergillus niger* van Teigh., 2 Nebr; *A. ustus* (Bain.) Thom & Church, 1 NJ; *Aureobasidium pullulans* (de Bary) Arn., 2 Man; *Botrytis cinerea* Pers., 2, 2a BC; *Chaetomium elatum* Kze. & Schm., 2 Conn; *C. globosum* Kze., 1 Conn, 2a Que; *C. murorum* Cda., 1 BC Mich; *Cunninghamella elegans* Lendner, 2 Conn; *Epicoccum neglectum* Desm., 2 BC [374]. *Fusarium avenaceum* (Fr.) Sacc., 1 BC; *F. equiseti* (Cda.) Sacc., 1, 2a BC, 2 Ont Nebr; *F. sambucinum* Fckl. var. *coeruleum* Wr., 2a BC; *F. sporotrichioides* Sherb., 2 BC [334]. *Mucor dimorphosporus* Lendner, *M. racemosus* Fres., 1 BC; *M. hiemalis* Wehmer, 2a BC; *Oospora lactis* Fres., 1, 2 BC; *Periconia pycnospora* Fres., 1 BC; *Rhizopus arrhizus* Fischer, 2 BC; *R. nigricans* Ehr., 1 BC; *Sordaria fimicola* (Rob.) Ces. & de Not., 1, 2 BC; *Stemphylium botryosum* Wallr., 2 BC; *S. radicinum* (Meier, Drechsl. & Eddy) Neerg., 2a BC; *Trichocladium asperum* (Cda.) Harz, 2 Mo; *Trichoderma viride* Pers., 1 Man; *Verticillium albo-atrum* Reinke & Berth., 2 BC [374].

Fusarium spp.: associated with storage breakdown of 1 Que 54:93, NB 43:71; *F. acuminatum* Ell. & Ev. and *F. poae* (Pk.) Wr. were isolated from decayed fruits of 1 Man and *F. oxysporum* Schlecht. from diseased cotyledons BC 45:78, [335]. *F. oxysporum* and *F. o.* var. *redolens* (Wr.) Gordon isolated from basal parts of wilted 2a Man and *F. sambucinum* f. 6 Wr., Alta 42:73.

Mycosphaerella citrullina (C.O.Sm.) Gross.: black rot, pourriture noire: on fruits of 1 NS 52:72, on seedlings BC 41:53.

M. tassiana (de Not.) Johans: on 1 BC [50].

Rhizopus sp.: cause of a storage rot of 1 NS 45:78, PEI 53:80; and *Pythium* sp. associated NS 37:42.

Sclerotinia sclerotiorum (Lib.) de Bary: sclerotinia rot, pourriture sclérotique: cause of a storage rot of 1 Alta 45:78, NB 26:27; a stem rot of 1 Alta 53:80; of wilt of 2a Man 32:58, PEI 43:79; a rot of fruit of 2a Alta 42:73; from seed of 2 Man [374].

Septoria cucurbitacearum Sacc.: leaf spot, tache septorienne: on 1 BC 58:76, on 1, 2 NS 53:80; severe on 1 in a field that produced an infected crop the previous year NS 56:85.

Verticillium albo-atrum Reinke & Berth.: wilt, flétrissure verticillienne: on 1 BC 51:76.

Beet curly-top virus: curly top, frisolée de la betterave: on 1 BC 44:73; on 2 BC 44:70; on 2a BC 40:62, 41:61.

Cucumber mosaic virus: cucumber mosaic, mosaïque du concombre: on 1 BC 56:85, Ont 36:39, 48:65, 50:84, Que 42:84; on 2 BC 56:85, Que 42:64; on 2a Ont 50:94, Que 42:73, 47:82; apparently seed-borne.

Virus: yellows, jaunisse: on 1 NB 45:78; on 2 NB 44:70.

Cuphea Adans.

LYTHRACEAE

Herbs or shrubs of N. and S. America; several grown in greenhouses.

Botrytis cinerea Pers.: on *C.* sp. Alaska [175].

Cupressus L.

PINACEAE

Coniferous trees or rarely shrubs, native to the warmer temperate and subtropical regions of the northern hemisphere.

1. *C. macrocarpa* Gord., Monterey cypress; native to Calif s. of Monterey.

Coryneum sp.: cause of a blight of leaves and twigs of 1 BC 52:104, [1198].

Phomopsis sp.: on 1 cult. BC F56:86.

Cyclamen L.

PRIMULACEAE

Tuberous scapose herbs native to the Mediterranean region and central Europe.

1. *C. persicum* Mill. (*C. indicum* Hort.), florists' cyclamen, cyclamen; native to Greece and Syria.

Botrytis cinerea Pers.: gray mold, moisissure grise: causes a blight of leaves and flowers of 1 BC 58:114, Ont 53:116.

Erwinia carotovora (L.R.Jones) Holland: soft rot, pourriture molle: on 1 Ont 54:130, PEI 43:116.

Meloidogyne sp. (*Heterodera marioni* (Cornu) Goodey): root-knot nematode, nodosité des racines: on 1 Ont 47:106.

Phyllosticta sp.: on leaves of *C.* sp. Ont 24:54.

Pythium sp.: cause of basal rot of 1 Ont 45:111.

Ramularia cyclaminicola Trel. (*Cladosporium cyclaminis* Massey & Telf.): stunt, rabougrissement: on 1 Que 41:90, 50:123; sometimes severe.

Thielaviopsis basicola (Berk. & Br.) Ferr. (not *Thielavia basicola* Zopf): black root rot, pourridié noir: on 1 Ont 23:118.

Cydonia Mill.

ROSACEAE

Deciduous unarmed shrub or small tree; one species native from Iran to Turkestan.

1. *C. oblonga* Mill. (*C. vulgaris* Pers.), quince, cognassier.

Botryosphaeria obtusa (Schw.) Shoem. (*Physalospora o.* (Schw.) Cke., *P. malorum* Shear; stat. conid. *Sphaeropsis malorum* Berk. ex Pk., non Berk.): black rot, pourriture noire: on 1 Ont 46:67, NS 25:35, 49:82, [1138].

Erwinia amylovora (Burr.) Winslow et al.: fire blight, brûlure bactérienne: on 1 Ont 44:85.

Fabraea maculata Atk. (stat. conid. *Entomosporium maculatum* Lév.): leaf blight, entomosporiose: on 1 BC 41:77, Ont 23:63; on fruits Ont 22:48. Infection may be severe in orchards where spraying is neglected.

Gymnosporangium clavariiforme (Pers.) DC.: rust, rouille: 0 I on 1 NS 36:61, [438; cf. 15, p. 373].

G. clavipes (Cke. & Pk.) Cke. & Pk. (*G. germinale* Kern): quince rust, rouille du cognassier: 0 I on 1 Ont 23:63, [828], NS 31:76, [1138], [cf. 15, p. 363].

Boron deficiency, carence de bore: corky core, liège: on fruit of 1 NS 39:92.

Cymbalaria Hill

SCROPHULARIACEAE

Creeping perennial herbs of the Old World.

1. *C. muralis* Gaertn., Mey. & Scherb. (*Linaria cymbalaria* (L.) Mill.), kenilworth, lierre fleuri; native to Europe and escaped from cult. in Canada in BC and Ont.

Botrytis cinerea Pers.: on 1 Alaska [175].

Cynosurus L.

GRAMINEAE

Annual or perennial grasses, native to Eurasia.

1. *C. cristatus* L., crested dog's-tail grass, crételle; in Canada in Nfld, from NS to Ont and in BC.

Passalora graminis (Fckl.) Höhn. (*Scolecotrichum g.* Fckl.): brown stripe, strie brune: on 1 BC 41:25, [535].

Cyperus L.

CYPERACEAE

The umbrella sedges are perennial or annual plants, native to tropical or temperate regions; very few are cult. and these mostly for ornament in foliage. *C. papyrus* L., native to s. Europe, Syria and Africa, was the source of paper for the ancient Egyptians and is grown now in aquaria.

1. *C. esculentus* L., ground almond, amande de terre; in Canada in NS, Que, Ont and Man,

often troublesome in cult. ground. 1a, *C. e.* var. *sativus* Boeckl., chufa, chufa; cult. for its edible tubers.

2. *C. strigosus* L.; in Canada in Que and Ont.

Puccinia canaliculata (Schw.) Lagerh.: II III on 1 Que [828]; on 2 Ont [15, p. 180].

Cypripedium L.

ORCHIDACEAE

Showy hardy terrestrial orchids, native to the northern hemisphere, often planted in moist shaded borders and bog margins.

1. *C. parviflorum* Salisb. (*C. calceolus* L. var. *parviflorum* (Salisb.) Fern.), yellow lady's slipper, sabot de la vierge; in Canada in Nfld and from NS to n. BC.

Puccinia cypripedii Arth. & Holw.: III on 1 Sask [93, p. 67]; a rare rust of which only II and III states are known [15, p. 229].

?Virus: streak, bigarrure: on *C. sp.* cult. BC 32:91.

Cyrtomium Presl

POLYPODIACEAE

Ferns native to Asia, Africa and the Pacific Islands.

1. *C. falcatum* (L.) Presl, house holly-fern; widespread in Japan, China, S. Africa and Polynesia.

Botrytis cinerea Pers.: on *C. sp.* Alaska [175].

Cystopteris Bernh.

POLYPODIACEAE

Delicate ferns nearly cosmopolitan in cool and temperate areas.

1. *C. bulbifera* (L.) Bernh. (*Filix b.* (L.) Underw.); in Canada from Nfld and NS to Man.
2. *C. fragilis* (L.) Bernh. (*Filix f.* (L.) Underw.); in Greenl, arctic Canada and Alaska, s. to Nfld, NS and Ont; also in Eurasia.

Ceratobasidium anceps (Bres. & Syd.) Jackson: on 1 Que [495].

Cladosporium herbarum Lk.: on 2 Greenl [900].

Fumago vagans Pers.: on 2 Greenl [901].

Hyalospora polypodii (Diet.) Magn.: II III on 1, 2 Ont [828]; on 2 Alaska [175], Alaska BC Sask Ont [15, p. 11], Sask [93, p. 63].

Mycosphaerella filicinum (Desm.) Starb.: on 2 Que [53].

Pleospora comata Auersw. & Niessl (*Pyrenophora c.* (Niessl) Sacc.): on 2 Greenl [603].

P. penicillus (Schm.) Fckl. var. *p.* (*Pyrenophora chrysospora* (Niessl) Sacc.): on 2 Greenl [900].

P. phaeocomoides (Berk. & Br.) Wint. (*P. vulgaris* Niessl): on 2 Frank [903].

Pyrenophora filicina Lind sp. dub. [1141, p. 302]: on 2 Greenl [601, p. 157].

Cystopteris

Synchytrium athyrii Lagerh.: on 2 BC [541].

Uredinopsis ceratophora Faull (*U. struthiopteridis* Stoerm. ex Diet. p.p.): II¹ II² III on 1 Ont [15, p. 4; cf. 828].

Cytisus L.

LEGUMINOSAE

Deciduous or evergreen shrubs, native mainly to the Mediterranean region; cult. for their profusion of flowers.

1. *C. scoparius* (L.) Lk., Scotch broom, genêt; native to central and s. Europe; long cult. and naturalized in Canada on Vancouver I.

Corticium galactinum (Fr.) Burt: on 1 BC [1198]; see *Abies*.

C. scutellare Berk. & Curt.: on 1 BC [1198].

Leptosphaeria californica (Cke. & Harkn.) Sacc.: on branches of *C. sp.* BC [50].

Odontia uda (Fr.) Bres.: on 1 BC [1198].

Peniophora aspera (Pers.) Sacc.: on 1 BC [1198]; see *Abies*.

P. incarnata (Pers. ex Fr.) Karst.: on 1 BC [1198].

P. sambuci (Pers.) Burt: on 1 BC [1198]; see *Acer*.

Polyporus versicolor L. ex Fr.: on 1 BC [1198].

Sebacina sp.: on 1 BC [1198].

Dactylis L.

GRAMINEAE

Perennial grasses native to Eurasia and n. Africa.

1. *D. glomerata* L., orchardgrass, chiendent à bossetes; cult. as a forage grass and escaped, in Canada from Nfld to BC; introduced from Europe.

Alternaria tenuis auct. sensu Wiltshire and *Aureobasidium pullulans* (de Bary) Arn.: from seed of 1 Ont [374].

Claviceps purpurea (Fr.) Tul.: ergot, ergot: on 1 Alaska [175, 1037], BC 53:51, Man 36:19, [93, p. 45], Ont 48:34, Que 56:46, NB 37:20, PEI 26:10; infected artificially by rye ergot [172].

Corynebacterium rathayi (E.F.Sm.) Dowson: bacterial blight, brûlure bactérienne: on 1 Que 46:30; apparently introduced with the seed, but not persisting, 49:36.

Curvularia inaequalis (Shear) Boed.: from seed of 1 Ont [374].

Darlucella filum (Biv.-Bern.) Cast.: on *Uromyces dactylidis* (q.v.) on 1 BC [535].

Epicoccum nigrum Lk.: from seed of 1 Ont [374].

Erysiphe graminis DC. ex Méral: powdery mildew, blanc: on 1 BC 34:26, [50], Alta 57:49, Ont 45:42; common in coastal BC.

Fusarium culmorum (W.G.Sm.) Sacc.: foot rot, piétin fusarien: on 1 BC 51:40, [335].

Leptosphaeria typharum (Desm.) Karst., sensu Berl.: on 1 BC [50].

Mastigosporium rubricosum (Dearn. & Barth.) Nannf.: purple eye-spot, tache pourpre ocellée: on 1 BC 35:22, 39:33, Que [1041], NB 60:82, NS 55:50; commonly reported in coastal BC and more recently in the Atlantic Provinces.

Passalora graminis (Fckl.) Höhn. (*Scolecotrichum g. Fckl.*): brown stripe, strie brune: on 1 BC 35:22,

Alta 54:53, Ont 39:33, NB 61:58, NS 51:40, Nfld 57:49.

Phyllachora graminis (Pers. ex Fr.) Fckl.: tar spot, rayure goudronneuse: on 1 BC [50].

Phyllosticta owensii Sprague: on 1 Que 61:58.

Pseudomonas syringae van Hall: bacterial leaf spot, tache bactérienne: on 1 Que. 43:38.

Puccinia graminis Pers.: stem rust, rouille de la tige: II III on 1 BC Ont 48:34, Man 42:34, [93, p. 68], Ont [828], PEI 43:38, [1138]; identified as *P. g. f. sp. avenae* Erikss. & Henn., Man 55:51; reported as *P. g. f. sp. phlei-pratensis* (Erikss.) Stakm. & Piem., Alta 56:46.

Rhynchosporium orthosporum Caldwell: on 1 Ont 56:46, 61:58, NB 60:82.

Sclerophthora cryophila W. Jones: downy mildew, mildiou: on 1 BC 54:53, [534].

Sclerotinia borealis Bubák & Vleug.: snow mold, moisissure nivéale: on 1 cult. BC [377].

Stagonospora arenaria Sacc.: purple brown spot, tache brun-pourpre: on 1 Que 56:46, [1041].

Uromyces dactylidis Otth: leaf rust, rouille des feuilles: on 1 BC 54:53, Que 56:46, NS 35:22, [1138], [cf. 15, p. 183].

Ustilago salvei Berk. & Br. (*U. striiformis* (West.) Niessl): stripe smut, charbon strie: on 1 BC 53:51, Ont Que 42:34, Ont [292].

Barley yellow dwarf virus: barley yellow dwarf, nanisme jaune: from 1 Ottawa, Ont [1030].

Dahlia Cav.

COMPOSITAE

Perennial herbs with tuberous roots native to Mexico and Guatamala.

1. *D. variabilis* (Willd.) Desf. (*D. pinnata* Cav.), common or garden dahlia, dahlia; cult. for its handsome flowers. The cultigen is probably derived from more than one species.

Agrobacterium tumefaciens (Sm. & Towns.) Conn (*Pseudomonas t.* (Sm. & Towns.) Duggar): crown gall, tumeur du collet: on 1 Sask 54:31, Ont 32:89, 51:112, PEI 51:112.

Botrytis cinerea Pers.: gray mold, moisissure grise: on 1 Alaska [175]; cause of a bud rot BC 30:87, Que 46:85, and of a tuber rot Que 27:95.

?*Erwinia carotovora* (L.R.Jones) Holland: cause of a tuber rot 1 NB 30:87.

Erysiphe cichoracearum DC. ex Méral: powdery mildew, blanc: on 1 Ont 39:103, NB 33:67; possibly in part *E. polyphaga* Hammarlund.

Fusarium spp. associated with blighted buds and stems: *F. avenaceum* (Fr.) Sacc., *F. equiseti* (Cda.) Sacc., *F. oxysporum* Schlecht., *F. o. var. redolens* (Wr.) Gordon, Man [335].

Phoma dahliae Berk.: leaf spot, tache phoméenne: on 1 NS 24:54; considered a secondary pathogen.

Pythium sp.: doubtfully the cause of a storage rot of 1 BC 49:103.

Sclerotinia sclerotiorum (Lib.) de Bary: sclerotinia rot, pourriture sclérotique: on 1 BC 29:67, Man Ont NS 25:69, Sask 43:105, Que 42:99.

Verticillium albo-atrum Reinke & Berth.: wilt, flétrissure verticillienne: on 1 Ont 61:112.

V. tenerum Nees (*Acrostalagmus cinnabarinus* Cda., imperfect state of *Nectria inventa* Plowr.): on old stems of 1 Man [93, p. 112].

Aster yellows virus: aster yellows, jaunisse de l'aster: on 1 Man 57:124, NB 30:87, PEI 42:99.

Dahlia mosaic virus: mosaic, mosaïque: mosaic symptoms recorded on 1 Sask Ont 34:83, Man 44:107, NB PEI 29:67; stunt, rabougrissement, or mosaic and stunt noted in BC Ont PEI 37:75, Man 44:107, Que 33:67, NB 38:100; the level of infection may be high Ont 36:75.

Dahlia ringspot virus: ringspot, tache annulaire: on 1 Man 51:112, Ont 37:75, Que 42:99, PEI 52:113.

Tomato spotted wilt virus: spotted wilt, tache de bronze: on 1 Man 45:111, Ont 39:103, Que 43:105.

Danthonia DC.

GRAMINEAE

Perennial grasses native to many parts of the world.

1. *D. californica* Boland.; in Canada in BC and s.w. Alta.
2. *D. intermedia* Vasey, known in Nfld and from Que to Mack and Alaska, also in w. US.
3. *D. spicata* (L.) Beauv., poverty oatgrass; in Canada from Nfld, NS and NB to BC.

Balansia hypoxylon (Pk.) Atk.: on 3 NS [1138].

Claviceps purpurea (Fr.) Tul.: 2 infected artificially by ergot from rye [172].

Leptosphaeria typharum (Desm.) Karst., sensu Berl.: on 2 BC [50].

Mycosphaerella tassiana (de Not.) Johans.: on 1 BC [50].

Selenophoma donacis (Pass.) Sprague & Johnson var. *stomaticola* (Bäuml.) Sprague & Johnson: on 3 Ont Que [1041].

Ustilago residua Clint.: on 2 Alaska [953]; on 3 Sask [292].

Daphne L.

THYMELEACEAE

Erect or prostrate shrubs native to temperate or tropical Europe and Asia; a few are cult.

1. *D. mezereum* L., February daphne, bois gentil; native to Europe and w. Asia.

Botrytis cinerea Pers.: on *D.* sp. NS 37:79, [1138].

Fusarium avenaceum (Fr.) Sacc.: on dead branches of 1 Ont 37:79, [335].

Marssonina daphnes (Desm. & Rob.) Magn. (*Gloeosporium mezereum* Cke.): leaf spot, anthracnose: on 1 BC 36:79, 37:39, NS 44:107, and probably in PEI 46:83. Causes severe defoliation which when repeated may eventually kill the host BC 49:103.

Trichothecium roseum (Pers.) Lk.: on *D.* sp. NS 37:79, [1138].

?Virus: mosaic, mosaïque: on 1 BC 57:112.

Daucus L.

UMBELLIFERAE

Annual or biennial more or less weedy plants of wide distribution; one widely cult. for its edible roots.

1. *D. carota* L., wild carrot or Queen Anne's lace, carotte sauvage; an abundant weed in Ont and Que, less common in the Maritime Provinces and in s. coastal BC; introduced from Europe. 1a, *D. carota* L. var. *sativa* DC., cultivated carrot, carotte cultivée.

Agrobacterium tumefaciens (Sm. & Towns.) Conn: crown gall, tumeur du collet: on 1a BC 48:39, Sask 58:51.

Alternaria dauci (Kühn) Groves & Skolko (*Macrosporium carotae* Ell. & Langl.): leaf blight, brûlure alternarienne: on 1a BC 35:26, Que 44:41, NS 38:30, [1138]. Cause of a destructive leaf disease in BC and NS and of a serious damping-off of seedlings, Ont 55:57; from seed of 1a BC Ont Que NS [374; cf. 380].

Botrytis cinerea Pers.: gray mold, moisissure grise: cause of an important rot of roots of 1a in storage BC 35:26, Que 59:49, NS 54:61, PEI 44:41, [cf. 1138].

Cercospora carotae (Pass.) Solh. (*C. apii* Fres. var. *c.* Pass.): leaf spot, brûlure cercosporéenne: on 1a BC 44:41, Man 55:57, Ont 43:45, Que 41:32, NS 51:45. Defoliation is often severe, causing direct loss of crop NS 41:45, but more often destroying its value for the profitable bunched-carrot trade Que 56:54, or from discolorations on the roots for the package market Man 55:57, NS 58:52. In NS 1 is affected and may be an important overwintering host, 58:52; *A. dauci* (q.v.) also present NS 59:46.

Cylindrocarpum radiculicola Wr.: from roots of 1a in storage NS 58:52.

Erwinia carotovora (L.R.Jones) Holland: soft rot, pourriture molle: on 1a grown from seed in field BC 35:27, Alta 39:38, Ont 45:50, Que 46:36, Nfld 55:57; on seed crops in field BC 41:32; on roots in storage BC [535], Que 40:32, NS 51:46, PEI 42:41, Nfld 52:46; losses may be heavy.

Fungi from seed: of 1a: *Alternaria consortialis* (Thüm.) Groves & Hughes, Calif; *A. tenuis* auct. sensu Wiltshire, BC Calif Holland; *A. tenuissima* (Fr.) Wiltshire, BC; *Aspergillus fumigatus* Fres., Conn; *A. phoenicis* (Cda.) Thom, Pa; *A. ustus* (Bain.) Thom & Church, Calif; *Chaetomium atrosporum* Skolko & Groves, Minn; *C. aureum* Chivers, Que; *C. elatum* Kze. & Schm., Calif; *C. funicola* Cke., Minn; *C. globosum* Kze., Que; *C. indicum* Cda., Minn; *Cladosporium herbarum* Lk., Calif; *C. malorum* Ruehle, BC Calif; *Cunninghamella elegans* Lendner., Minn [374]. *Fusarium acuminatum* Ell. & Ev., Man; *F. culmorum* (W.G.Sm.) Sacc., *F. equiseti* (Cda.) Sacc., *F. poae* (Pk.) Wr., Ont; *F. avenaceum* (Fr.) Sacc., *F. sambucinum* Fckl., Denmark [334]. *Gonatobotrys simplex* Cda., *Melanosporella papillata* Hotson, Man; *Oospora lactis* Fres., NY; *Papularia arundinis* (Cda.) Fr., Mich; *Petriella asymmetrica* Curzi, Que; *Rosellinia limoniiiformis* Ell. & Ev., BC; *Sordaria curvispora* Cain, Calif; *S. fimicola* (Rob.) Ces. & de Not., BC; *S. inaequalis* Cain, Calif; *Sporormia australis* Speg., Conn; *Stachybotrys chartarum* (Ehr.) Hughes, Minn; *Stemphylium botryosum* Wallr., Calif [374]. *S. radicinum* (Meier, Drechsl. & Eddy) Neerg., frequent, BC Man NS [380]. *Trichocladium asperum* (Cda.) Harz, Conn; *Trichoderma viride* Pers., *Verticillium albo-atrum* Reinke & Berth., BC [374].

Fusarium spp.: associated with a rot of roots of 1a in field Alta 35:26, Man Ont 38:30, and in storage Que 59:46. The following species were isolated from 1a, mainly from roots in storage: *F. acuminatum* Ell. & Ev., BC Man; *F. avenaceum* (Fr.)

Daucus

Sacc., Ont; *F. equiseti* (Cda.) Sacc., *F. oxysporum* Schlecht., *F. o.* var. *redolens* (Wr.) Gordon, Man; *F. solani* (Mart.) App. & Wr., Alta Man [335].

Meloidogyne sp. including *M. hapla* Chitwood (*Heterodera marioni* (Cornu) Goodey): root-knot nematode, nodosité des racines: on *Ia* Ont 42:41, 61:65, Que 46:36, but known from 1930. Losses have been heavy in the Montreal district, 46:36.

Phytophthora megasperma Drechsl.: root rot, mildiou: on *Ia* BC 54:61.

Rhizoctonia crocorum (Pers.) DC.: violet root rot, rhizoctone violet: on *Ia* BC 40:32, [535], Alta 37:37, Sask Ont 49:42. The fungus is apparently indigenous in the Thedford Marsh, Ont 49:42, where 10 per cent of the roots may be severely infected; pathogen is unspecialized to its hosts [1166].

Rhizopus sp.: from roots of *Ia* in storage Alta 50:52.

Sclerotinia sclerotiorum (Lib.) de Bary (*S. libertiana* Fckl.): sclerotinia rot, pourriture sclérotique: on *Ia* BC 34:31, Alta 30:40, Sask 38:30, Sask Man [93, p. 42], Que 31:37, NB 22:53, NS 29:27, PEI 26:22. A very common cause of decay of roots in storage, but occasionally seen in the field BC 34:31; losses may be severe.

Stemphylium radicinum (Meier, Drechsl. & Eddy) Neerg. (*Alternaria radicina* M.D. & E.): black rot, pourriture noire: on *Ia* BC 42:41, Alta 45:50, Sask 46:35, Man 44:41, Que 49:46, NB 29:27, NS 43:45, [cf. 1138]. A seed-borne pathogen, readily controlled by seed treatment [742]. Causes seedling blight, leaf spot and root rot; the 1942 seed crop was heavily infected and seedling blight was common when such seed was sown. Losses may be heavy from storing roots already infected or storing clean roots in contaminated cellars, 44:41; apparently more prevalent than *A. dauci* (q.v.).

Streptomyces scabies (Thaxt.) Waks. & Henrici (*Actinomyces s.* (Thaxt.) Güssow): scab, gale commune: on *Ia* Alta 43:45.

Xanthomonas carotae (Kendr.) Dowson (*Pseudomonas c.* Kendr.): bacterial blight, brûlure bactérienne: on *Ia* BC 41:32, 42:42, Man 39:30, [93, p. 28], Ont Que 43:36. Most often noted in seed crops in the BC interior; a seed-borne pathogen, which may be controlled by seed treatment, 44:41.

Aster yellows virus (callistephus virus 1): aster yellows, jaunisse de l'aster: on *Ia* BC Sask 43:46, Alta Ont 44:42, Man 37:25, Que 41:32, NB 32:36, NS 38:30, PEI 39:37, Nfld 49:xx, 50:53. The disease is reported almost annually in the Maritime Provinces and is sporadically severe in NB, NS and PEI. Although not reported on *Ia* in Que before 1941 and in Ont before 1944, losses are sometimes severe on carrots grown on muck soils for fresh vegetables and processing Ont 57:55. Sporadic outbreaks have also been observed in the Prairie Provinces. Affected plants of perennial weeds, such as *I*, *Chrysanthemum leucanthemum*, *Erigeron canadensis*, *Leontodon taraxacum*, *Plantago ?major*, have been noted about carrot fields NS 40:32, 41:32, 42:42, and are thought to be the source of infection. In the west, wind-borne viruliferous *Macrosteles fascifrons* is believed to be the chief cause of primary infection. Cultivar differences in susceptibility could not be demonstrated Ont 55:59. Roots grown in Texas appeared to be infected when examined in Winnipeg, 55:59.

Virus: dwarf, nanisme: reported on *Ia* NB 47:45, 48:40, 49:42, but not fully identified.

Boron deficiency, carence de bore: reported once on *Ia* BC 43:47.

Decodon J.F.Gmel.

LYTHRACEAE

Perennial herb of N. America.

1. *D. verticillatus* (L.) Ell., water willow, décodon verticillé; in Canada from NS to Ont.

Puccinia minutissima Arth: 0 I on *I* Ont [15, p. 203; 828].

Delphinium L.

RANUNCULACEAE

Perennial and annual plants native to the north temperate zone; some cult. for their showy flowers.

1. *D. ajacis* L., rocket larkspur, bec d'oiseau; the common annual garden larkspur, native to s. Europe, somewhat naturalized in N. America.
2. *D. brownii* Rydb., larkspur, pied d'alouette; Alaska to Man; often cultivated; poisonous to livestock.
3. *D. cultorum* Voss.; often used to designate the perennial garden larkspurs, which are derived from more than one species native to Asia and Europe; probably most records of diseases are on this host.
4. *D. menziesii* DC.; BC and Wash.

Ascochyta sp. (non *A. aquilegiae* (Rabh.) Höhn.): on stems of *D.* sp. Alta 31:97, on leaves Sask 41:90; cf. 45:108, 111.

Botrytis cinerea Pers.: gray mold, moisissure grise: on *D.* spp. BC [535].

Cicinnobolus cesatii de Bary: on *Erysiphe polygoni* (q.v.) on *D.* sp. Man 45:111.

?*Corynebacterium fascians* (Tilf.) Dowson: fasciation, fasciation: on *D.* spp. Sask 52:113, NB 41:90, 45:111.

Entyloma winteri Linh.: on 2 BC Alta [957].

Erwinia carotovora (L.R.Jones) Holland (*E. ?atro-septica* (van Hall) Jennison): foot rot, pourriture du pied: on *D.* spp. BC 58:114, [535].

Erysiphe cichoracearum DC. ex Mérat: powdery mildew, blanc: on *D.* spp. BC [50], BC Ont NB 24:55, etc., but see below.

E. polygoni DC. ex Mérat: powdery mildew, blanc: on *D.* spp. BC 32:91, 33:111, [50], Alta 47:106, Sask PEI 30:87, Sask Man [93, p. 44], Man 24:79, Ont NB 29:70, Que 35:69, NS 33:70, [1138]; widespread and sometimes severe Que 44:108.

Fusarium spp.: wilt, flétrissure fusarienne: on *D.* spp. BC 31:96, Alta 47:107, Ont 57:124; *F. solani* (Mart.) App. & Wr. isolated from diseased *I* Man 38:100, [335].

Metasphaeria zobeliana Staritz: on 2 BC [50].

Mycosphaerella tassiana (de Not.) Johans.: on *D.* sp. BC [50].

Phoma jacquiniana Cke. & Masee: on dying stems of *D.* sp. Ont 34:87.

Pseudomonas delphinii (E.F.Sm.) Stapp (*Bacterium d.* (E.F.Sm.) Bryan): bacterial blight, brûlure bactérienne: on *D.* spp. BC 31:96, Sask Man [93, p. 28], Ont 28:95, Que 35:69, NB 29:70, NS 30:89, PEI 25:70; widespread and sometimes severe.

Puccinia recondita Rob. ex Desm. (*P. rubigo-vera* Wint. var. *agropyrina* (Erikss.) Arth.): on native *D.* sp. BC [535; cf. 15, p. 180].

Rhizoctonia solani Kühn: on *D.* spp. Man [93, p. 125].

Sclerotinia sclerotiorum (Lib.) de Bary: sclerotinia rot, flétrissure sclérotique: cause of a crown rot of *D.* sp. PEI 39:103.

Sclerotium delphinii Welch: crown and root rot, pourridié sclérotique: on *D.* spp. Man [93, p. 126], Que 44:108.

Synchytrium sp.: on 4 BC [541].

Aster yellows virus: aster yellows, jaunisse de l'aster: on *D.* spp. Alta 56:125, NB 35:69, 47:107, PEI 32:88.

?Cucumber mosaic virus: mosaic, mosaïque: on *D.* spp. BC 47:107, Alta 39:103, NB 41:90, PEI 38:100.

Virus: stunt, rabougrissement viral: on *D.* spp. Alta 55:121, Ont 34:77.

Iron deficiency, carence de fer: on *D.* sp. Sask 50:124.

Dennstaedtia Bernh. POLYPODIACEAE

Pubescent ferns native to tropical regions and e. N. America and Asia.

1. *D. punctilobula* (Michx.) Moore, hay-scented fern; in Canada from Nfld and NS to Ont.

Ceratobasidium anceps (Bres. & Syd.) Jackson: on 1 Que [495].

Dentaria L. CRUCIFERAE

Perennial herbs of the northern hemisphere.

1. *D. diphylla* Michx., pepper root, corson, snicroûte; in Canada in NS and from Que to s. Ont.

Albugo cruciferarum S.F.Gray (*A. candida* (Pers. ex Lév.) O. Kuntze, *Cystopus candidus* (Pers. ex Lév.) de Bary): on 1 Que 34:100, NS [1138].

Deschampsia Beauv. GRAMINEAE

Tufted perennial grasses of cold and temperate regions.

1. *D. alpina* (L.) Roem. & Schult. (*Aira a.* L.); native to arctic E. Canada and Eurasia.
2. *D. atropurpurea* (Wahl.) Scheele (*Vahlodea a.* (Wahl.) Fr.); in Labr, Nfld, Que, Alta, BC and Alaska.
3. *D. brevifolia* R. Br. (*Aira caespitosa* L. var. *arctica* Thurb., *D. arctica* (Spreng.) Merr.); across arctic Alaska, Canada and in Greenl.
4. *D. caespitosa* (L.) Beauv. (*Aira c.* L.), seven-year grass, herbe sure; in N. America and Eurasia as follows: 4a, *D. c.* var. *glauca* Hartm.) Lindm.f., from Nfld to BC. 4b, *D. c.* var. *littoralis* Reut.) Richter, in Labr, Nfld, e. Que, Man and Alaska. 4c, *D. c.* var. *parviflora* (Thuill.) Coss. & Germ., introduced into Canada in NB, Que and Ont.

5. *D. flexuosa* (L.) Trin. (*Aira f.* L.); in Greenl, Labr, Nfld, NS, Ont and Alaska.

Other host: 6, *D. beringensis* Hult.

Low-temperature basidiomycete: on 2 Alaska [1042].

Colletotrichum graminicola (Ces.) G. W. Wils.: on 4 Alaska [1037].

Curvularia geniculata (Tracy & Earle) Boed.: on 6 Alaska [1037].

Didymosphaeria arenaria Mouton var. *macrospora* Sacc. & Scalia: on 4 Alaska [175].

Leptopeziza groenlandica Rostr.: on 1 Greenl [899].

Leptosphaeria arundinacea (Sow.) Sacc.: on 3 Greenl [603].

L. eustoma (Fckl.) Sacc. (*Phaeosphaeria e.* (Fckl.) Holm): on 4a Que [53].

L. insignis Karst. and *L. microscopica* Karst.: on 3 Frank [604].

L. typharum (Desm.) Karst., sensu Berl.: on 2 BC [50].

Lophodermium arundinaceum (Schrad. ex Fr.) Chev.: on 2, 5 Greenl [899].

Microthyrium culmigenum Syd.: on 2 Alaska [1038].

Mollisia cinerea (Batsch) Karst.: on 1 Greenl [899].

M. graminis (Desm.) Karst.: on 2 Greenl [899].

Mycosphaerella deschampsiae Sprague: on 2 Alaska [1037, 1038].

M. ignobilis (Auersw.) Syd. (*Sphaerella i.* Auersw.): on 1 Greenl [899].

M. lineolata (Rob. in Desm.) Schroet.: on 4a Que [53].

M. pusilla (Auersw.) Johans. (*Sphaerella p.* Auersw.): on 3 Frank [903].

M. tassiana (de Not.) Johans. (*Sphaerella t.* de Not.): on *D.* spp. BC [50]; on 1, 5 Greenl [899]; on 3 Frank [604, 903], Greenl [601, 602].

Ophiobolus graminis Sacc.: on 4 Alaska [1037].

Phoma graminis West.: on 1 Greenl [899].

Platyspora pentamera (Karst.) Wehm. (*Pleospora p.* Karst., *Clathrospora p.* (Karst.) Berl.): on 3 Frank [604, 903].

Puccinia coronata Cda.: II III on 4 Alta Sask [15, p. 153; 948], Sask [93, p. 67].

P. graminis Pers.: II III on 4 Sask [15, p. 174; 93, p. 68].

P. poae-nemoralis Otth (*P. poae-sudeticae* (West.) Jørstad var. *airae* (Lagerh.) Arth.): on 2 Alaska [1037]; II III on 4 Alaska [175], Alta [15, p. 151], Yukon [1042].

P. praegracilis Arth. var. *connersii* (Savile) Savile (*P. connersii* Savile): II III on 2 Que [948, p. 665; 950, p. 458], [cf. 828].

Pyrenopeziza karstenii Sacc. (*Mollisia graminis* Karst. non *Peziza g.* Desm.): on 1 Greenl [899]; on 4 Greenl [601].

Ramularia pusilla Ung. (*Ovularia p.* (Ung.) Sacc. & D.Sacc.): on 2 Alaska [1037].

Selenophoma everhartii (Sacc. & Syd.) Sprague & Johnson: on 4 BC Alaska [1042]; on 6 Alaska [1037].

Stagonospora gramineum Sacc. & Scalia: on 2 Alaska [175, 1037].

S. vexatula Sacc.: on 4, 6 Alaska [1037].

Tilletia cerebrina Ell. & Ev.: on 4 Alaska [195, 1037], Frank [292].

Typhula incarnata Lasch ex Fr.: on 2 Alaska [1042].

Wettsteinina niessli Müll. (*Leptosphaeria gigaspora* Niessl): on 3 Greenl [602].

Descurainia Webb & Berth.

CRUCIFERAE

Annual or biennial herbs of N. America and Europe.

1. *D. pinnata* (Walt.) Britt. var. *brachycarpa* (Richards.) Fern. (*Sisymbrium canescens* Nutt., var.), green tansy mustard, moutarde tanaïsie verte; in Canada from Que to Mack.
2. *D. richardsonii* (Sweet) O.E. Shulz (*Sisymbrium incisum* Gray), gray tansy mustard, moutarde tanaïsie grise; in Canada from Que to the Yukon.
3. *D. sophia* (L.) Webb (*Sisymbrium s. L.*, *Sophia multifida* Gilib.), flixweed, sagesse des chirurgiens; a weed across Canada, most abundant on the Canadian prairies, introduced from Europe.

Albugo cruciferarum S. F. Gray (*A. candida* (Pers. ex Lév.) O. Kuntze): white rust, albugine: on 2 Man, 3 Sask [93, p. 29].

Peronospora parasitica (Pers. ex Fr.) Fr. (*P. sophiae-pinnatae* Gäum.): on 2 Man [93, p. 30].

Puccinia aristidae Tracy: 0 I on ?I Sask [93, p. 66; cf. 15, p. 157].

Sclerotinia sclerotiorum (Lib.) de Bary: sclerotinia rot, pourriture sclérotique: on 3 Sask 50:39.

Desmodium Desv.

LEGUMINOSAE

Perennial or sometimes annual herbaceous to almost arborescent plants of the temperate to tropical regions of the western hemisphere and in Australia and S. Africa.

1. *D. canadense* (L.) DC., beggar's-lice; in Canada from NS to s. Sask.
2. *D. dillenii* Darl.; from s.e. Mass to Mich and Ill and south, but unknown in Canada.

Microsphaera diffusa Cke. & Pk.: powdery mildew, blanc: on 1 NS [1138].

Uromyces hedysari-paniculati (Schw.) Farl.: 0 I II III on 1 Ont [828]; on 2 Ont [15, p. 241]; aecia unknown in Ont [828].

Dianthus L.

CARYOPHYLLACEAE

Annual or perennial herbs, native to Europe, Asia and Africa, some extending across Asia to arctic America; widely grown in gardens and one species under glass.

1. *D. barbatus* L., sweet william, jalousie ou œillet de poète; native to Eurasia, widely cult. and escaped in Que and e. US.
2. *D. caryophyllus* L., carnation, œillet des fleuristes; native from s. Europe to India, widely cult. in gardens and under glass.

3. *D. chinensis* L., rainbow pink, œillet de Chine; native to e. Asia. 3a, *D.c.* var. *hedde-wigii* Regel, dentate rainbow pink.

4. *D. plumarius* L., cottage pink, mignardise ou œillet de faisan; native to Eurasia.

Alternaria spp.: *A. dianthi* Stev. & Hall recorded as the cause of a leaf spot or blight, brûlure alternarienne, of 2 Ont 25:69, NB 27:94, and of a seedling blight BC 45:111, although the pathogen may have been *A. dianthicola* Neerg., 49:103. The latter was collected on 2 Ottawa, Ont, and Montreal, Que, by Dr. Neergard and preserved in DAOM; also recorded on 1 Ont 59:87, Que 61:112. *A. dianthi* was determined from cuttings of 2 imported from Denmark and grown in Alta, 61:112; also recorded on 1 Ont NB 61:112 and Que 52:113; doubtfully on 1 Man [93, p. 112].

Botrytis cinerea Pers.: gray mold, moisissure grise: on *D. sp.* Sask 45:112, NB 35:65, NS 34:81; on 2 Ont 50:124, on 2, 3a Alaska [175].

Fusarium spp., including *F. oxysporum* Schlecht. f. *dianthi* (Prill. & Del.) Snyder & Hansen: associated with wilt of 2 BC 59:87, Man 41:90, Ont 49:104, Que 56:126. Isolated from basal parts of wilted plants were: *F. oxysporum* from 1 Man [335], 2 Man 41:90, [335]; *F.o.* var. *redolens* (Wr.) Gordon from 2 Man [335]; *F.o.* f. *dianthi* from 1 Que 45:112, [335], 2 Man [335].

Fusarium spp.: associated with stem rot of cuttings of 2 Alta 56:126, Ont 56:126 et seq. Also associated with basal rot of more mature plants from which were isolated: *F. acuminatum* Ell. & Ev. from 3 Man 39:103, [335]; *F. avenaceum* (Fr.) Sacc. from 2 NS 51:112, [335], Alta 40:91; *F. culmorum* (W.G.Sm.) Sacc. from 2 Ont [335]; *F. equiseti* (Cda.) Sacc. from 1 Man [335], 2 BC 47:107, [335]; *F. solani* (Mart.) App. & Wr. from 2 Man [335].

Fusarium spp., including *F. poae* (Pk.) Wr.: associated with bud rot, pourriture des boutons, of 2 BC 43:106, Que 49:104; of 4 Ont 48:107.

Heteropatella valtellenensis (Trav.) Wr.: leaf rot, pourriture du feuillage: on 2 BC 47:107, 48:107.

Heterosporium echinulatum Berk.: leaf spot, tache hétérosporienne: on *D. sp.* cult. Sask [93, p. 120]; on 1 BC 42:99; on 2 BC 34:81, Ont 58:115. The perfect state, *Didymellina dianthi* C.C. Burt, has not been observed in Canada, 41:91.

Hormodendron elatum Hartz: on 2 BC [535].

Meloidogyne incognita (Kofoid & White) Chitwood: root-knot nematode, nodosité des racines: on 2 Ont 61:113.

Mycosphaerella caryophylli (Pass.) Cruchet (*Sphaerella c. Pass.*): on 2 Alaska [175].

Pseudomonas caryophylli Burkh.: bacterial wilt, flétrissure bactérienne: on imported cuttings of 2 Ont 56:126.

P. woodsii (E.F. Sm.) Stev.: bacterial leaf spot, tache bactérienne des feuilles: on 2 Alta 41:91, Ont 38:101, NS 55:121. Not common, but destructive when present.

Rhizoctonia solani Kühn: stem rot, rhizoctone commun: on 1 Man 45:112, Ont 49:104, 55:112.

Sclerotinia sclerotiorum (Lib.) de Bary: sclerotinia rot, pourriture sclérotique: on 2 Ont 56:126.

?*Septoria dianthi* Desm.: leaf spot, tache septorienne: on *D. sp.* Alta 47:107.

Uromyces dianthi (Pers.) Niessl (*U. caryophyllinus* Wint.): rust, rouille: II III on 2 Alaska [175], BC Alta 30:85, Sask 43:106, Sask Man [93, p. 72], Ont

24:54, Que 25:69, NB PEI 26:33, NS 35:65, [cf. 1138]; on *D. spp.* (pinks) NB 41:91; a common and often destructive pathogen on greenhouse carnations. This heteroecious rust is apparently spread entirely by urediniospores in N. America, the 0 I state on *Euphorbia* being unknown, [cf. 15, p. 286].

Ustilago violacea (Pers.) Roussel: anther smut, charbon des anthères: on 2 Ont 33:65, 34:81, [292]; only Canadian records.

Vermicularia subeffigurata Schw.: on *D. sp.* NS [1138].

Xanthomonas oryzae (Uyeda & Ishiyama) Dowson var. *dianthi* Thomas & Dickens [?inedit.]: pimple, papule: on 2 Ont 54:131, 56:126.

Aster yellows virus: aster yellows, jaunisse de l'aster: on 2 Man 57:124.

Carnation mosaic virus: mosaic, mosaïque: on 1 Ont 54:32; on 2 Ont 46:83; carnation stocks in Ont rather widely infected, 51:112.

Carnation streak virus: streak, bigarrure: on 2 Ont 50:124, 51:112.

Virus: yellows: on 2 Ont 50:124, ?Que 56:126.

Boron deficiency, carence de bore: on 2 BC 51:113, Ont 59:88.

Chemical injury: by sulphur dioxide on 2 Ont 46:83; by ?2,4-D on 2 Ont 54:132.

Diapensia L. DIAPENSIACEAE

Boreal herbs, one in arctic regions of N. America and Eurasia and a second in the Himalayas.

1. *D. lapponica* L.; arctic regions of Canada south to Que, Nfld, n. New England and n. NY.

Apiothyrium arcticum Petr.: on 1 Frank Labr [52].

Ascochyta diapensiae Karst.: on 1 Greenl [901, p. 70].

Excipula diapensiae Rostr.: on 1 Labr [604], Greenl [901, p. 71].

Guignardia diapensiae (Rehm) Arx & Müller: on 1 Que [52].

Mycosphaerella polyspora Johans.: on 1 Frank Keew Que [52].

M. tassiana (de Not.) Johans. (*Sphaerella pachyasca* Rostr.): on 1 Greenl [899, 901].

M. tassiana var. *arctica* (Rostr.) Barr: on 1 Frank [52].

Septoria diapensiae Karst.: on 1 Greenl [900, 901].

Trochila phacidioides Schrad.: on 1 Greenl [899].

Dicentra Bernh. FUMARIACEAE

Perennial herbs native to N. America and Asia.

1. *D. canadensis* (Goldie) Walp., squirrel corn, cœurs saignants des bois; in Canada in s.w. Que and Ont.
2. *D. cucullaria* (L.) Bernh., Dutchman's-breeches, culottes de hollandais; in Canada in NS and from Que to Ont.
3. *D. formosa* (Andr.) Walp., western bleeding heart, dicentre de l'Ouest; in BC to central Calif.

4. *D. spectabilis* (Don.) Lem., bleeding heart, cœurs saignants; cult., native to Japan.

Ceratobasidium anceps (Bres. & Syd.) Jackson: on 2 Que [495].

Peronospora dicentrae Syd. ex Gäum. (*P. corydalis* de Bary): on 1 Ont 33:111.

Sclerotinia ?sclerotiorum (Lib.) de Bary: on 4 NB 27:93.

Thelephora terrestris Ehr. ex Fr.: associated with the crowding out of 4 Alta 58:115.

Dieffenbachia Schott ARACEAE

Woody-stemmed plants of tropical America; some cult. under glass.

Xanthomonas dieffenbachiae (McCull. & Pirone) Dowson: bacterial leaf spot, tache bactérienne: on *D. sp.* Ont 53:116, 57:125.

Diervilla Duham. CAPRIFOLIACEAE

Low upright shrubs native to N. America.

1. *D. lonicera* Mill., bush honeysuckle, herbe bleue; in Canada from Nfld and NS to Man.

Godronia turbinata (Schw.) Farl.: on 1 NS [1138].

Ramularia umbrina Davis: on leaves of 1 Ont [93, p. 125].

Septoria diervillae Ell. & Ev.: leaf spot, tache septorienne: on 1 Man 44:99, Ont [93, p. 138].

Digitalis L. SCROPHULARIACEAE

Tall herbs native to Europe and w. and central Asia.

1. *D. ferruginea* L.; native to s. Europe and w. Asia.
2. *D. lanata* Ehr.; cult. in BC for its alkaloid; native to s.e. Europe.
3. *D. purpurea* L., common foxglove, gantière; introduced from Europe, escaped from cult. and locally abundant in Nfld and NS.

Other host: 4, *D. argyrostigma*.

Colletotrichum fuscum Laub: anthracnose, anthracnose: on 2 BC 52:30, [535].

Phyllosticta digitalis Bellynick: leaf spot, tache foliaire: on 1, 2, 3, 4 Ont 43:106; on 3 Alaska [175], PEI 46:83.

Pleospora herbarum (Fr.) Rabh.: on *D. sp.* BC [50].

Pythium sp.: cause of a stem and crown rot of 2 BC 52:30, [535].

Ramularia variabilis Fckl.: leaf spot, tache des feuilles: on 3 BC [535].

Verticillium sp.: on *D. sp.* BC 58:115.

Virus: mosaic and streak, mosaïque et bigarrure: on *D. sp.* NB 43:106.

Digitaria Heister

GRAMINEAE

Annual, mostly weedy grasses of warm and temperate regions.

1. *D. ischaemum* (Schreb.), Muhl., small crabgrass; common weed of lawns, in PEI, Que, Ont and probably elsewhere in Canada, naturalized from Europe.
2. *D. sanguinalis* (L.) Scop., crabgrass, sanguinette; a troublesome weed in lawns and cultivated ground, in s. Canada; naturalized from Europe.

Ustilago syntherismae (Schw.) Pk.: smut, charbon: on 1 Ont 59:42; on 1, 2 Ont [292].

Dimorphotheca Vaill.

COMPOSITAE

Herbs or subshrubs of s. Africa, two cult. in flower gardens.

1. *D. sinuata* DC. (*D. aurantiaca* Hort. non DC.), Cape marigold; an annual.

Albugo tragopogonis Pers. ex S.F. Gray: white rust, albugine: on ? *D. sp.* Sask [93, p. 29].

Botrytis cinerea Pers.: cause of a crown rot of *D. sp.* NS 40:92; on 1 Alaska [175].

Aster yellows virus: aster yellows, jaunisse de l'aster: on *D. sp.* NB 30:86, 47:107; on 1 Man 24:108; apparently not common on this host.

Dirca L.

THYMELAEACEAE

A much branched shrub of N. America.

1. *D. palustris* L., leatherwood, bois de plomb; in Canada from NB to Ont.

Aecidium hydnoideum Berk. & Curt. (*Puccinia extensicola* Plowr. var. *hydnoidea* Arth.): 0 I on 1 Ont 33:111, Que 34:100. According to Parmelee [828] this aecium does not appear to be connected with the carex rust complex, *P. dioicae* (*P. extensicola*), as suggested by Arthur [15, p. 200].

Disporum Salisb.

LILIACEAE

Perennial herbs of N. America and e. and s. Asia.

1. *D. hookeri* (Torr.) Britt. var. *oreganum* (S. Wats.) Q. Jones; BC to Idaho and Oregon.
2. *D. majus* (Hook.) Britt.; in Canada in BC and Alta.

Septoria streptopodis Pk.: on *D. sp.*, 1, 2 BC [963].

Distichlis Raf.

GRAMINEAE

Perennial grasses of N. and S. America and Australia.

1. *D. spicata* (L.) Greene, salt grass; in Canada on the coasts of NS, NB and PEI, along the Gulf of St. Lawrence in Que, and in coastal BC; also on the Pacific coast of S. America.

2. *D. stricta* (Torr.) Rydb., alkali grass; in Canada in the interior from Man to BC.

Endodothella tracyi (Ell. & Ev.) Theiss. & Syd.: on 2 BC [50].

Mycosphaerella graminicola (Fckl.) Schroet.: on 1 BC [50].

Phyllachora graminis (Pers. ex Fr.) Fckl.: on 2 Sask [93, p. 47]; probably this collection should be referred to *P. diplocarpa* Ell. & Ev. [cf. 805].

Puccinia aristidae Tracy: II III on 1 BC [535]; on 2 Sask Man [93, p. 66]; on 2, erroneously as 1, Alta Sask [15, p. 159].

Uromyces peckianus Farl.: on 1 BC 33:111, BC NS [15, p. 160], [cf. 1138].

Draba L.

CRUCIFERAE

Low herbs mainly of the northern hemisphere, but some fruticose species occur in S. America.

1. *D. alpina* L.; arctic Alaska, Canada and Greenl; also in Eurasia.
2. *D. aurea* Vahl; Labr and Greenl to Alaska and BC.
3. *D. cinerea* Adams (*D. magellanica* Lam. var. *c.* (Adams) Ostf.); Greenl to Yukon and Alaska; s. to BC, Man, Que and Ont.
4. *D. crassifolia* R. Grah.; Greenl to Alaska; s. to Labr, Que, Alta and BC.
5. *D. fladnizensis* Wulf.; Greenl to Alaska and BC.
6. *D. glabella* Pursh; Nfld and Que to Man and Alaska.
7. *D. hirta* L. (*D. arabisans* Michx.); Greenl to Alaska, s. to Labr, NS and BC.
8. *D. incana* L.; Greenl, Labr, Nfld and Que to Man; also in Europe.
9. *D. incerta* Payson; Alta and BC.
10. *D. lactea* Adams; Greenl, arctic Canada and Alaska.
11. *D. nivalis* Lilj.; Alaska to Greenl; s. to Labr, Que and BC.
12. *D. oblongata* R. Br.; Green and Frank.
13. *D. paysonii* Macbr.; Alaska, Alta and BC.
14. *D. prealta* Greene; Mack, Yukon, Alta and BC.
15. *D. stenoloba* Ledeb.; Alaska to Alta and Calif.
16. *D. subcapitata* Simmonds; Greenl to Keew and n. Que.

Other hosts: 17, *D. adamsii* Ledeb. 18, *D. arctica*

Vahl. 19, *D. bellii* Holm. 20, *D. corymbosa* Th. Fries. 21, *D. glacialis* Adams. 22, *D. lutea* Gilib. 23, *D. vernalis* (*D. ?verna* L.). 24, *D. wahlenbergii* Hartm.

- Acrospermum compressum* Tode: on 13 BC [50].
Cladosporium herbarum Lk.: on 5 Greenl [601]; on 7 Frank [903], Greenl [601, 899].
Diplodina papaveris (Oud.) Lind: on 11 Greenl [603].
Erysiphe polygoni DC. ex Mérat (*E. martii* Lév.): on 7 Greenl [899].
Heteropatella umbilicata (Pers. ex Fr.) Jaap (*Septoria cercosperma* Rostr.): on 2, 19, 24 Greenl [899]; on 11 Greenl [603].
Hymenula macrospora Sacc. & Roum.: on 24 Greenl [899].
Laestadia circumtegens Rostr.: on 7 Greenl [899, p. 547].
Leptosphaeria tenera Ell.: on 15 BC [50].
L. vahlii Rostr.: on 6 Frank [52].
Leptostromella drabae Dearn.: on 20 Mack [250, p. 18C].
Mycosphaerella confinis (Karst.) Lind: on 1 BC [50].
M. cruciferarum (Fr.) Lindau (*Sphaerella c.* Fr.): on 1 Que [52]; on 4 Greenl [899]; on 11 Greenl [902]; on 16 Frank [903].
M. pyrenaica (Speg.) Arx: on 1, 10, 16, 19 Frank [971].
M. tassiana (de Not.) Johans. (*M. pachyasca* (Rostr.) Vesterg., *Sphaerella p.* Rostr.): on *D. spp.* BC [50]; on 1 Alaska [175], Frank [605], Greenl [604]; on 1, 7, 11 Greenl [901]; on 1, 3, 5 Greenl [605]; on 2, 7, 5 forma *tenuisiliqua* Yukon [600]; on 5, 7, 8 Greenl [902]; on 5, 16, 17 Greenl [602]; on 7 Greenl [899]; on 11 Mack [250]; on 18 Greenl [601].
M. tassiana var. *arctica* (Rostr.) Barr: on 1 Que, 6 Frank [52].
M. tassiana var. *tassiana*: on *D. sp.*, 10 Frank, 7 Labr [52].
Peronospora parasitica (Pers. ex Fr.) Fr. sensu lat. (*P. norvegica* Gäum.): on 10 Frank [962].
Phoma nebulosa (Fr.) Mont. in Berk.: on 2 Greenl [603]; on 8 Greenl [900]; on 24 Greenl [899].
Platyspora pentamera (Karst.) Wehm. (*Clathrospora p.* (Karst.) Berl., *Pleospora platyspora* sensu Rostr.): on 1 Greenl [603]; on 2 Greenl [899, 901]; on 16 Frank [52]; on 21 Greenl [602].
Pleospora ambigua (Berl. & Bres.) Wehm.: on *D. sp.*, 16 Frank [52].
P. amplispora Ell. & Ev.: on 15 BC [50].
P. androsaces Fckl. (*Pyrenophora a.* (Fckl.) Sacc.): on 5 Frank [605].
P. anthyllidis Auersw. & Niessl: on 1 Que [52].
P. cerastii Oud. (*Pyrenophora c.* (Oud.) Lind): on 3, 17, 21 Greenl [603].
P. coloradensis Ell. & Ev.: on 16 Frank [52].
P. comata Auersw. & Niessl: on 10 Frank [52].
P. drabae Schroet. var. *nuda* Dearn.: on 11 Mack [250, p. 9C]; cf. *P. scrophulariae* var. *spinosella*.
P. helvetica Niessl: on *D. spp.* BC [50]; on *D. sp.* Que, *D. sp.*, 6, 11, 12, 18 Frank [52].
P. herbarum (Fr.) Rabh.: on 1, 7, 11 Greenl [901]; on 3, 5, 17 Greenl [602]; on 5, 11 Frank [903]; on 6, 10 Frank, 7 Labr [52]; on 11 Greenl [902]; on 24 Greenl [899].
P. penicillus (Schm.) Fckl. var. *p.* (*P. chrysospora* Niessl, *Pyrenophora c.* (Niessl) Sacc.): on 3 Greenl [603]; on 7, 11, 18 Greenl [899]; on 21 Frank [900].

- P. phaeocomoides* (Berk. & Br.) Wint. var. *insectoria* (Fckl.) Wehm. (*P. i.* Fckl.): on 1, 3, 11, 16 Greenl [603]; on 1, 16, 17 Greenl [602].
P. pyrenaica Niessl: on 1 Greenl [604].
P. scrophulariae (Desm.) Höhn. var. *compositarum* (Earle) Wehm. (*P. c.* Earle, *P. media* Niessl): on 13 BC [50]; on 23 Alaska [175].
P. scrophulariae var. *?spinosella* (Rehm) Wehm. (*P. drabae* Schroet.): on 1 Frank [899]; on 1, 5, 18, 20 Greenl [601]; on 1, 5 Greenl [902]; on 7, 24 Greenl [899]; on 9 Yukon [600].
P. tragacanthae Rabh.: on 3 Frank [52]; on 14 BC [50].
Pseudopeziza drabae (Nannf.) Nannf.: on 5, 11 Frank [605].
Puccinia drabae Rud.: III on *D. sp.* Man [93, p. 67], Ont [828]; on *D. sp.*, 2 Alaska [175]; on 2 Alaska, 7 Alaska Que, 8 Alaska, 9 Alta [15, p. 291]; on 6 Frank Mack Que [605]; on 7 Greenl [899].
P. holboelli (Hornem.) Rostr. (*P. thlaspeos* Schub. p.p.): III on 11 Que [828; cf. 15, p. 149].
Selenophoma drabae (Fckl.) Petr. (*Rhabdospora d.* (Fckl.) Berl. & Vogl.): on *D. sp.* Greenl [899, 901]; on 1, 7, 16, 18 Greenl [601]; on 3, 5, 11 Greenl [603].

Dracocephalum L.

LABIATAE

Herbaceous plants of the northern hemisphere.

1. *D. parviflorum* Nutt., dragonhead; in Canada from Que to the Yukon, most frequent in the Prairie Provinces.
- Leptosphaeria doliolum* (Pers.) de Not.: on dead stems of 1 Man [93, p. 54].
Phyllosticta dracocephali Dearn. & Bisby: common on 1 Man [93, p. 135].
Septoria ?dracocephali Thüm.: on 1 Sask [93, p. 138].

Dryas L.

ROSACEAE

Low-growing shrubs of the northern hemisphere.

1. *D. drummondii* Richards.; from Nfld, Que and n. Ont to Mack and in Alaska.
2. *D. integrifolia* Vahl (*D. octopetala* auct. non L.), including 2a, *D. i.* f. *canescens* (Simmons) Fern.; arctic N. America south to Nfld, Que and Alta.

Other host: 3, *D. × lewinii* Rouleau.

- Cainiella johansonii* (Rehm) Müller: on 1, 2 Que, 2a Nfld [52].
Chaetapiospora islandica (Johans.) Petrak: on 1, 2, 2a, 3 Nfld, 2 Frank Que [52].
C. minor Barr: on 1, 2, 2a, 3 Nfld [52, p. 70].
Didymella exigua (Niessl) Sacc.: on 2 Frank [52].
Didymosphaeria dryadis (Fckl.) Berl. & Vogl.: on 2 Frank [600, 604], Greenl [601, 899, 901].
Gnomonia dryadis Auersw.: on 2 Labr [52].
Gnomoniella vagans Johans.: on 2 Frank [52].
Helotium scutula (Pers. ex Fr.) Karst.: on 1 Alaska [182, 1038].

Dryas

- Isothea rhytismoides* (Bab. ex Berk.) Fr. (*Carlia r.* (Berk.) Kuntze, *Hypospila r.* (Berk.) Niessl, *Laestadia r.* (Berk.) Sacc.): on ?1 BC [50]; on 1 Alta, 2 Frank Man [959]; on 2 Frank Labr Que [52], Frank [600, 603, 971], Greenl [601, 603, 899, 902]; on 2a Greenl [602].
- Leptosphaeria hyperborea* (Fckl.) Berl. & Vogl.: on 1, 3 Nfld, 2 Frank Que [52].
- Leptosphaerulina pulchra* (Wint.) Barr (*Pleospora oligasca* Bubák): on 2 BC [50].
- Melanomma dryadis* Johans.: on 2 Alaska [1038], Frank [604], Greenl [601].
- Melasmia dryadis* Rostr.: on 2 Greenl [899, p. 575].
- Mycosphaerella ootheca* (Sacc.) Dearn. (*Sphaerella o.* Sacc.): on 2 Alaska [175], Frank [903], Greenl [899, 902].
- M. tassiana* (de Not.) Johans. (*M. pachyasca* (Rostr.) Vestrgr.): on 2 Mack [250]; on 2 f. *hirsuta* Yukon [600].
- M. tassiana* var. *tassiana*: on 2 Frank [52].
- Ophiobolus callapsus* Ell. & Sacc.: on 2 Frank Nfld. [52].
- Platyspora pentamera* (Karst.) Wehm. (*Clathrospora p.* (Karst.) Berl.): on 2 Frank [52].
- Pleospora cerastii* Oud. (*Pyrenophora c.* (Oud.) Lind): on 2 Greenl [603].
- P. coluteae* (Goid.) Wehm. (*P. cylindrospora* Wehm.): on 2 Nfld [52].
- P. helvetica* Niessl: on 1 Que, 2 Frank Que Nfld, 3 Nfld [52].
- P. herbarum* (Fr.) Rabh.: on 2 Frank [52], Greenl [603].
- Stictis integrifolia* Fr.: on 2 Greenl [901].
- Synchytrium cupulatum* Thomas: on 2 Keew [541], Frank Man [959].
- Trichothyrium dryadis* (Rehm) Rehm: on 2 Frank Que Nfld [52].
- Wettsteinina dryadis* (Rostr.) Petrak (*Massarina d.* Rostr., *Massaria d.* (Rostr.) Lind): on 1 BC [50]; on 2 Alaska [175, 1038], Mack [250], Man [604], Frank Que Labr Nfld [52], Greenl [603; 899, p. 560]; on 2 var. *intermedia* Greenl [602].
- W. mirabilis* (Niessl) Höhn.: on 2 Nfld [52].

Dryopteris Adans.

POLYPODIACEAE

Ferns, mostly of the woods in tropical and temperate regions of the world; very few common in cult.

1. *D. austriaca* (Jacq.) Woyn. var. *austriaca* (*D. dilatata* (Hoffm.) Underw., *D. spinulosa* (Müll.) Watt var. *americana* (Fisch.) Fern., *Thelypteris s.* (Müll.) Nieuwl. var. *a.* (Fisch.) Weath.), florists' fern, fougère; including 1a, *D. a.* var. *intermedia* (Muhl.) Morton (*D. spinulosa* var. *i.* (Muhl.) Underw., *T. s.* var. *i.* (Muhl.) Nieuwl.); and 1b, *D. a.* var. *spinulosa* (Müll.) Fiori (*D. s.*, *Thelypteris s.*); Greenl, Labr, Nfld and NS to Alaska.
2. *D. disjuncta* (Ledeb.) Morton (*D. linnaeana* Christens., *Phegopteris dryopteris* (L.) Fée, *Thelypteris d.* (L.) Slosson), oak fern; Greenl, Labr, Nfld and NS to Alaska.
3. *D. filix-mas* (L.) Schott (*Lastrea f.-m.* (L.) Presl), male fern, fougère mâle; Greenl and Nfld to BC, s. to NB and Ont.

4. *D. fragrans* (L.) Schott; arctic regions s. to Labr, Que, Mack, Yukon and Alaska.
5. *D. marginalis* (L.) Gray; in Canada in NS and from Que to BC.
6. *D. phegopteris* (L.) Christens, beech fern; Greenl, Labr and NS to Alaska.
7. *D. thelypteris* (L.) Gray var. *pubescens* (Lawson) Nakai, marsh fern; Nfld and NS to Man.

- Ceratobasidium anceps* (Bres. & Syd.) Jackson: on 1b Ont Que, 2, 6 Ont [495].
- Dasyscyphus aspidii* (Lib.) Cash: on *D. sp.* Alaska [176, p. 45]; on 1 Alaska [1038].
- Herpobasidium filicinum* (Rostr.) Lind: on 2 NS [1138].
- Hyalopora aspidiotus* (Magn.) Magn.: II III on 2 BC F52:151, [1198], Alaska [175], Ont 22:190, [828], BC Ont Que [15, p. 10].
- Milesia dilatata* Faull: II III on 1 BC F52:151, [1198; cf. 15, p. 8].
- M. fructuosa* Faull (*M. intermedia* Faull): II III on 1 Que, 1a Ont Que NS [15, p. 8]; on 1b NS [1138]; on 1a Ont Que NS [286; cf. 828]; III on overwintered fronds of 1a and in the fall on the season's fronds of 1 Ont [863].
- M. marginalis* Faull & Wats.: II III on 5 Ont Que [286; 15, p. 9; cf. 828]. III develops in spring on overwintered fronds of 5 in Ont; telia intraepidermal, multicellular and thin-walled [863].
- Mollisia* sp.: on 1 Alaska [1038].
- Mycosphaerella filicinum* (Desm.) Starb. (*Sphaerella f.* (Desm.) Auersw.): on 3 Greenl [900].
- M. minor* (Karst.) Johans.: on 4 Labr [52].
- Taphrina fusca* Gies.: on 1b NB [734, 735, 1138].
- Uredinopsis atkinsonii* Magn. (*U. struthiopteridis* auct. non Störmer): II¹ II² III on 1 Ont [289], Ont NS [15, p. 4; cf. 828, 1138].
- U. phegopteridis* Arth.: II III on 2 BC [1198], Alta Ont Que NB NS [286], Alta NS [15, p. 4], Ont [863], [cf. 828, 1138].

Dulichium Pers.

CYPERACEAE

A perennial plant of e. N. America.

1. *D. arundinaceum* (L.) Britt., three-way sedge; in Canada from Nfld to BC.
- Puccinia dioicae* Magn. (*P. extensicola* Plowr.): II III on 1 Ont [13, p. 362], Que 32:102, [cf. 15, p. 197].

Dupontia R. Br.

GRAMINEAE

Arctic or subarctic grasses of the northern hemisphere.

1. *D. fischeri* R. Br., including 1a, *D. f.* ssp. *psilosantha* (Rupr.) Hult. (*D. p.* Rupr.); from Alaska across Canada to Greenl.
- Claviceps purpurea* (Fr.) Tul.: on 1 Mack [605]. Apparently in error as the so-called ergot bodies examined proved to be nematode galls caused by *Anguina agrostis* (Steinbuch) Filipjev or a closely related species.

Entyloma ambiens (Karst.) Johans.: on 1 Frank [600]. Liro [609] found only ascomycetes present when he examined this and other collections of this supposed smut on *Dupontia*.

Hendersonia arundinacea (Desm.) Sacc.: on 1 Frank [604].

Leptosphaeria caricinella Karst.: on 1 Frank [604].

L. hierochloae Oud.: on 1 Mack [250].

L. insignis Karst.: on 1 Frank [600, 604].

Mollisia graminea Karst.: on 1 Frank [600].

Mycosphaerella recutita (Fr.) Johans.: on 1 Frank [52].

M. tassiana (de Not.) Johans. (*Sphaerella t.* de Not.): on 1a Greenl [899].

M. wichuriana (Schroet.) Johans.: on 1 Frank [600].

Platyspora pentamera (Karst.) Wehm. (*Clathrospora p.* (Karst.) Berl., *Pleospora p.* Karst.): on 1 Alaska [175], Frank [600].

Pleospora heleocharidis Karst. var. *arctica* (Karst.) Wehm. (*P. a.* Karst.): on 1 Frank [52].

Selenophoma everhartii (Sacc. & Syd.) Sprague & Johnson: on 1a Alaska [1037].

Septoria arctica Berk. & Curt.: on 1 Alaska [1037].

Echinochloa Beauv.

GRAMINEAE

Coarse annual grasses of tropical and temperate regions.

1. *E. crus-galli* (L.) Beauv., barnyard grass, pied-de-coq; mainly in Eastern Canada but rare from Man westward, introduced from Europe.

2. *E. pungens* (Poir.) Rydb., including 2a, *E. p.* var. *microstachya* (Wieg.) Fern. & Griseb.; abundant in Western Canada and less common in the east.

3. *E. walteri* (Pursh) Nash; in Canada in Ont and Que.

Drechslera dictyoides (Drechs.) Shoem. f. sp. *dictyoides*: on 1 Ont [993].

Tolyposporium bullatum (Schroet.) Schroet.: on 1 NS [292, 953, 1138], Ont [292]; on 2a, 3 Ont [953].

Ustilago crus-galli Tracy & Earle: on 1 Que [292].

Echinocystis Torr. & Gray

CUCURBITACEAE

Tall climbing annuals of N. and S. America.

1. *E. lobata* Torr. & Gray, wild cucumber, concombres grimpants; in Canada from NB to Sask; cult. for arbors and freely escaping.

Erwinia tracheiphila (E.F.Sm.) Holland: on 1 Que 40:34.

Septoria cucurbitacearum Sacc.: leaf spot, tache septorienne: on 1 Que 55:122, but not distinguished from *S. sicyi* (q.v.).

S. sicyi Pk.: on 1 Man [93, p. 139].

Cucumber mosaic virus: cucumber mosaic, mosaïque du concombre: on 1 Alta 38:33, ?Ont 43:28.

Echinops L.

COMPOSITAE

Coarse thistlelike herbs; some perennial species cult. for their foliage and large prickly heads.

1. *E. exaltatus* Schrad., globe thistle, boulette; native to Siberia; apparently the species commonly cult., but often under other names.

Agrobacterium tumefaciens (Sm. & Towns.) Conn: crown gall, tumeur du collet: on *E. sp.* PEI 59:88.

Elaeagnus L.

ELAEAGNACEAE

Deciduous or evergreen shrubs or trees, native to s. Europe, Asia and N. America.

1. *E. angustifolia* L., oleaster or Russian olive, olivier de Bohême; native to Eurasia, long cult. in Europe and planted to some extent in Canada, especially on the prairies.

2. *E. commutata* Bernh. (*E. argentea* Pursh, non Moench), wolf willow, bois d'argent; mainly from Que to Alaska.

Cercospora manitobana Davis: on 2 Sask Man [93, 114]. *Cucurbitaria elongata* (Fr.) Grev.: on 2 Man [93, p. 51].

Cytospora chrysosperma (Pers.) Fr.: on 1 Sask F51:144. *Didymosphaeria* sp.: on 1 Alaska [175].

Fusarium acuminatum Ell. & Ev. and *F. solani* (Mart.) App. & Wr.: from diseased basal parts and roots of 1 Sask [335].

F. avenaceum (Fr.) Sacc.: from twigs of 2 Man [93, p. 117].

Peniophora crenea (Bres.) Sacc. & Syd.: on 2 Man [93, p. 78].

Phyllosticta argyrea Speg.: leaf spot, tache foliaire: on leaves of 1 Man 45:102.

Pseudomonas sp.: bacterial leaf spot, tache bactérienne: on 1 Man 45:102.

Puccinia caricis-shepherdiae Davis: rust, rouille des carex: 0 I on 1 Sask, 2 Alta Sask Man [93, p. 67; 15, p. 211]; on 1 BC 37:83, Man 45:102.

P. coronata Cda.: 0 absent or abortive, I on 2 Alta Sask [15, p. 152], Mack 40:101, Sask Man [93, p. 67].

P. coronata "var." *elaegni* Fraser & Ledingham: I only on 2 Sask [312]; aecia formed on 2 without the necessity of spermatization [138].

Septoria elaeagni (Chev.) Desm.: leaf spot, tache septorienne: on 1, not 2 Man 42:100, 43:96.

Eleocharis R.Br.

CYPERACEAE

Mainly perennial plants, nearly cosmopolitan, mostly of tropical and warm temperate regions.

1. *E. acicularis* (L.) Roem. & Schultes; Labr to BC, into the US and in Eurasia.

2. *E. palustris* (L.) Roem. & Schultes; Labr, Nfld and NS to Alaska, into the US and in Eurasia.

Eleocharis

3. *E. parvula* (Roem. & Schultes) Lk. (*Scirpus parvulus* Roem. & Schultes); Nfld, also BC to Calif.
4. *E. pauciflora* (Lightf.) Lk. (*Scirpus pauciflorus* Lightf.); Nfld, NS, NB and Que; BC and Alaska.

Claviceps nigricans Tul: on *E. sp.* Sask [93, p. 45]; on 1 NS [1138].

Leptosphaeria culmorum Auersw.: on 3 Greenl [900].

Puccinia eleocharidis Arth.: II III on *E. sp.* Man [93, p. 67]; on *E. sp.*, 2 Ont [828]; on 2 Ont [15, p. 193]. [cf. 1138].

Septoria punctoidea Karst.: on 4 Greenl [900].

Elymus L.

GRAMINEAE

Erect tufted perennial grasses of N. and S. America, Eurasia and N. Africa.

1. *E. canadensis* L., Canada wild rye, seigle sauvage; from NB to Mack and Alaska and s. into the US.
2. *E. diversigluminis* Scribn. & Ball (*E. interruptus* auct. Am.); Ont to s. Sask and south.
3. *E. giganteus* Vahl; native to Siberia; cult. for ornament.
4. *E. glaucus* Buckl. (*E. marginalis* Rydb.); Ont to BC, Yukon and Alaska. 4a, *E. g.* var. *virescens* (Piper) Bowden (*E. v.* Piper, *E. howellii* Scribner & Merr.); Alaska to BC and Calif.
5. *E. hirsutus* Presl; Alaska and BC to Calif.
6. *E. innovatus* Beal; Alaska and BC to n. Ont, s. into the US.
7. *E. junceus* Fisch., Russian wild rye; native to Eurasia, recently introduced in cult. for forage.
8. *E. macounii* Vasey (\times *Agrohordeum m.* (Vasey) Lepage); Minn to Alaska and south.
9. *E. mollis* Trin. (*E. arenarius* L. var. *villosus* Mey., *E. villosus* auct.), strand wheat, seigle de mer; including 9a, *E. m.* ssp. *villosissimus* (Scribn.) Löve; Greenl and NS to Alaska.
10. *E. piperi* Bowden (*E. cinereus* sensu Hitchc., *E. condensatus* auct.); s. BC, Alta and Sask [cf. 106].
11. *E. sibiricus* L.; Mack and Alaska.
12. *E. \times vancouverensis* Vasey; BC and Wash.
13. *E. virginicus* L., terrell-grass or wild rye; including 13a, *E. v.* var. *jejunus* (Ramaley) Bush (*E. j.* (Ramaley) Rydb.), and 13b, *E. v.* var. *submuticus* Hook. (*E. curvatus* Piper); Nfld to Alta and BC.

Other host: 14, *E. dahuricus* Turcz.

Alternaria tenuis auct. sensu Wiltshire: from seed of 13 Man [374].

Bipolaris sorokiniana (Sacc. in Sorok.) Shoem. (*Helminthosporium sativum* Pamm., King & Bakke): on leaves of 1 Man [93, p. 120]; from seed of 13 Man [374].

Cladosporium bruhnii Linder: on 9 Que [605, p. 259].

C. cladosporioides (Fres.) De Vries: from seed of 13 Man [374].

C. graminum Cda.: on 9 Greenl [899].

Claviceps purpurea (Fr.) Tul.: ergot, ergot: on *E. spp.* BC [50]; on 1 Alta 34:100, Que 24:58; on 1, 4 Alta, 6 BC Alta, 1, 2, 7, 11, 13 artificially infected with cultures from rye [172]; on 1, 6, 8, 13a, 14 Man, 6 Sask Man [93, p. 45]; on 6 Alta 53:51; on 9 Alaska [175, 1037, 1038], BC 58:46; on 10 BC 33:111, Alta 30:95; also on 4 BC [535; cf. 1034].

Colletotrichum graminicola (Ces.) G.W.Wils.: on 9 Alaska [1037, 1038].

Drechslera tritici-repentis (Died.) Shoem. (*Helminthosporium t.-r.* Died.): leaf blotch, tache drechslerienne: on 1 Man 34:100, [93, p. 120], Ont [993]; on 6 Alaska [175, 1037], Alta Man 57:24.

Epichloë typhina (Pers.) Tul: choke, quenouille: on *E. sp.* Man 33:111, [93, p. 46]; on 1 Que 25:78; on 6 Sask 52:40.

Epicoccum nigrum Lk.: from seed of 13 Man [374].

Erysiphe graminis DC. ex Méral: powdery mildew, blanc: on 7, 10 Alta 46:30; on 7 Alaska [175, 1037], Sask, where host is susceptible, 58:46.

Heterosporium phlei Gregory: on 7 Alaska [175, 1037].

Leptosphaeria sp.: on 9 Alaska [1038].

L. arundinacea (Sow.) Sacc.: on 9 Greenl [900].

L. culmicola (Fr.) Auersw.: on 9 NB [1138].

L. culmifraga Ces. & de Not.: on 8 BC [50].

L. typharum (Desm.) Karst., sensu Berl.: on *E. spp.* BC [50].

Lophodermium arundinaceum (Schröd. ex Fr.) Chev.: on *E. sp.* Frank [250]; on 9 Alaska [175, 1038], BC [1203], Mack [250, 604], Frank [604], Greenl [899; cf. 959].

L. arundinaceum var. *alpinum* Rehm: on 9a Keew [959], Frank [962].

L. culmigena (Fr.) Höhn.: on 9 Que [605].

Low-temperature basidiomycete, basidiomycete frigidophile: on ? Alta 56:46; *E. spp.* moderately resistant [217].

Mollisia graminis (Desm.) Karst.: on 9 Greenl [899].

Mycosphaerella pusilla (Auersw.) Johans. (*Sphaerella p.* Auersw.): on 9 Greenl [900].

M. tassiana (de Not.) Johans.: on 6 BC [50].

M. tassiana var. *tassiana*: on 9 Frank [52].

M. tulasnei (Jancz.) Lindau: on 9 \times *Agropyron trachycaulum* Alaska [1038].

Nigrospora sphaerica (Sacc.) Mason: from seed of 13 Man [374].

Papularia arundinis (Cda.) Fr.: from seed of 13 Man [374].

Passalora graminis (Fckl.) Höhn. (*Scolecotrichum g.* Fckl.): brown stripe, strie brune: on 1 Alta 56:46; on 3 cult. Man 43:38; on 4 BC 42:35; on 9 Alaska [175, 1037]; also on 4, 10 Alta, 6 BC [1034].

Phyllachora graminis (Pers. ex Fr.) Fckl.: tar spot, rayure goudronneuse: on *E. sp.* Alta 43:38; on 1 Sask Man, 13 Man [93, p. 47]; on 1 Man Ont, 13 Ont [1034]; on 4 BC [1040]; on 9 Greenl [900]; on 10 BC [50]; on 13 Ont [805].

Platyspora pentamera (Karst.) Wehm. (*Clathrospora p.* (Karst.) Berl.): on 9 Frank [52].

- Pleospora* sp.: on 9 Alaska [1038].
P. herbarum (Fr.) Rabh. (*P. discors* (Dur. & Mont.) Ces. & de Not.): on 9 Alaska Mack [250], Frank [600].
P. affin. herbarum: on 9a Frank [962].
P. vagans Niessl: on 9 Greenl [899].
Puccinia coronata Cda.: crown rust, rouille couronnée: II III on 1, 13b, 14 cult. Man 43:38; on 1 Sask, 6 Alta [15, p. 153; cf. 93, p. 67].
P. graminis Pers.: stem rust, rouille de la tige: II III on 1, 8, 14 Sask Man, 4, 13, 13b cult. Man [93, p. 68; cf. 15, p. 175].
P. montanensis Ell.: II III on leaves of 1 Alta 24:58; on 1, 14 Man 43:38; on 13a, 13b Man [93, p. 69; cf. 15, p. 152].
P. recondita Rob. ex Desm. (*P. clematidis* Lagerh., *P. rubigo-vera* Wint., *P. r.-v.* var. *agropyri* (Erikss.) Arth.): leaf rust, rouille des feuilles: II III on 2 Sask, 8 Sask Man [93, p. 70]; on 2 Sask, 4a Alaska, 8 Alta, 9 Alaska, 12 BC, 13 Man Ont Que, 13a, 13b Man [15, p. 177]; on 4a, 9 Alaska [175]; on 4a, 9, 12 Alaska [1037]; on 7, 10 cult. Alta 46:30; on 10 BC 33:111.
P. striiformis West. (*P. glumarum* (Schmidt) Erikss. & Henn.): stripe rust, rouille striée: II III on 4, 4a BC 31:4, [15, p. 186].
Pyrenophora macrospora (Schroet.) Wehm. (*Clathrospora m.* (Schroet.) Nannf., *Pleospora m.* Schroet.): on 6 BC [50]; on 9 Greenl [900].
Pythium graminicola Subram. (*P. arrhenomanes* Drechsl.): on 1 Sask 37:6, [1034].
Ramularia pusilla Ung. (*Ovularia p.* (Ung.) Sacc. & D.Sacc.): on 4 BC [1034, 1035].
Rhizoctonia solani Kühn: on 9 Alaska [1042].
Rhynchosporium orthosporum Caldwell: on 5 Alaska [1042].
Sclerotinia borealis Bubák & Vleugel: snow mold, moisissure nivéale: on 1, 11, cult. BC [377].
Selenophoma donacis (Pass.) Sprague & Johnson (?*Septoria bromigena* Sacc.): on 8 Sask 34:101, [1034]; on 9 Alaska [1042].
Septogloeum oxysporum Sacc., Bomm. & Rouss.: on 4 BC [1198].
Septoria sp. (non *S. elymi* Ell. & Ev., nec *S. elymi* Rostr.): on 9 Keew [604].
S. agropyrina Lobik: on 9 Alaska [1037].
S. avenae Frank f. sp. *triticea* T.Johnson: on 9 BC [1041].
S. elymi Ell. & Ev.: on 1 Ont [1034].
S. nodorum Berk.: on 1, 3 Man 43:38, [1034].
S. pacifica Sprague: on 9 Alaska [1037].
Stagonospora arenaria Sacc.: on 7, 9 Alaska [175, 1037].
Urocystis agropyri (Preuss) Schroet.: on *E.* sp. Alta [292]; on ?1 Man [93, p. 61]; on 9 Keew Que [292, 953], Greenl [900].
Ustilago bullata Berk. (*U. lorentziana* Thüm.): on 8 Man [93, p. 62; 292].
U. salvei Berk. & Br. (*U. striiformis* (West.) Niessl): on 8 Sask [93, p. 62].

Empetrum L.

EMPETRACEAE

Procumbent shrubs of Eurasia and N. America, one species in the subantarctic.

1. *E. atropurpureum* Fern. & Wieg.; in Canada in Labr, PEI, NS and Que.

2. *E. eamesii* Fern. & Wieg.; in Canada in Labr, Nfld and NS.
3. *E. nigrum* L., black crowberry, corbigeau; including 3a, *E. n.* var. *hermaphroditum* (Lange) Sørensen; Greenl, Labr, and Nfld, across arctic Canada to Alaska, in alpine areas into the US and in Eurasia.

- Ascochyta baccae* Rostr.: on 3 Greenl [900, p. 621].
Botryosphaeria empetri (Rostr.) Arx & Müller (*Physalospora e.* Rostr.): on 3 Alaska [175], Frank Labr Que [52].
Chrysomyxa empetri Schroet. ex Cummins: II III on 1 Que, 2 Nfld, 3 Alta NS Nfld [288]; on 3 Alaska [175], BC Que [15, p. 31], Alaska Yukon Mack Frank Man Que NS [947], Keew Labr Nfld [955], Greenl [899]; on 3a Que [605], [cf. 93, p. 45].
Exobasidium empetri Ito & Otani: on 3 BC [958].
E. vaccinii (Fckl.) Wor.: on 3 Alaska [1038]; but probably belongs in *E. empetri* (q.v.).
Herpotrichiella fusispora Barr: on 3 Que [53].
Limacinia arctica (Woronichin) Barr: on branches of 3 Que [53, p. 310].
Metasphaeria empetri (Fr.) Sacc.: on 3 Frank [250].
Mycosphaerella tassiana (de Not.) Johans. var. *tassiana*: on 3 Que [53].
Physalospora crepiniana Sacc. & March.: on 3 Alaska [175], Yukon [250]; probably not distinct from *Botryosphaeria empetri* (q.v.) [cf. 52].
Septoria empetri Rostr.: on 3 Greenl [899, p. 574; 901].
Sphaeropezia empetri (Fr.) Rehm: on 3 Alaska [175].
Sporomega empetri Rostr.: on 3 Greenl [899, p. 543].

Epigaea L.

ERICACEAE

Prostrate or trailing, scarcely shrubby plants, native to e. N. America and Japan.

1. *E. repens* L., mayflower, fleur de mai; represented in Canada by *E. r.* var. *glabrifolia* Fern.; in acid soils, in Nfld and from NS to Man; rarely cult.

Microsphaera penicillata (Wallr. ex Fr.) Lév. var. *vaccinii* (Schw.) W.B.Cke. (*M. alni* (Wallr.) Salm. var. v. (Schw.) Salm.): on 1 NS 57:125, [1138].

Epilobium L.

ONOGRACEAE

Mostly perennial herbs of cool and temperate regions of the world.

1. *E. anagallidifolium* Lam. (*E. alpinum* auct.); Nfld and Que to Alaska and Eurasia.
2. *E. angustifolium* L. (*Chamaenerion spicatum* (Lam.) S.F.Gray), great willow herb or fireweed, bouquets rouges; Greenl and Labr to Alaska and Eurasia.
3. *E. coloratum* Biehler; NS to Que and Ont.
4. *E. glandulosum* Lehm.; including 4a, *E. g.* var. *adenocaulon* (Hausskn.) Fern. (*E. a.* Hausskn.); and 4b, *E. g.* var. *occidentale*

Epilobium

- (Trel.) Fern. (*E. o.* (Trel.) Rydb.); Nfld to Alaska and south.
5. *E. hirsutum* L.; naturalized from Europe; in Canada in Que and Ont.
 6. *E. hornemanni* Reichenb.; Nfld and Que to Yukon, Alaska, BC and Calif.
 7. *E. latifolium* L. (*Chamaenerion l.* (L.) Spach), river beauty, powna; Greenl, Nfld and Que to Alaska and south.
 8. *E. luteum* Pursh; Alaska, Alta and BC.
 9. *E. minutum* Lindl.; BC.
 10. *E. palustre* L., including 10a, *E. p.* var. *grammophyllum* Hausskn.; Greenl, Labr and Nfld to Alaska.
 11. *E. paniculatum* Nutt., including 11a, *E. p.* var. *subulatum* Fern.; BC to Man and rare in Ont and Que.
- Other hosts: 12, *E. alsinefolium* Vill. 13, *E. behringianum* Hausskn. 14, *E. boreale* Hausskn. 15, *E. brevistylum* Barbey. 16, *E. clavatum* Trel. 17, *E. davuricum* Fisch. var. *arcticum* (Sam.) Polunin. 18, *E. lactiflorum* Hausskn. 19, *E. leptocarpum* Hausskn. 20, *E. leptophyllum* Raf. 21, *E. oregonense* Hausskn. 22, *E. tetragonum* Pollich.
- Aecidium epilobii* DC. and *Caeoma epilobii* Schlecht. (?*Puccinia pulverulenta*, q.v.): on *E. sp.* Alaska [175].
- Botrytis cinerea* Pers.: on ?*E. sp.* Alaska [175]; on 12 Greenl [900].
- Ceratobasidium anceps* (Bres. & Syd.) Jackson: on 2, 4a Ont [495].
- Cladosporium herbarum* Lk.: on 7 Greenl [901].
- Diaporthe pardolata* (Mont.) Fckl.: on 2 BC [50].
- D. racemula* (Cke. & Pk.) Sacc.: on *E. spp.*, 2 NS [1138].
- Didymella hellebori* (Fr.) Sacc.: on 2 Que [52].
- Doassansia epilobii* Farl.: on 1 BC, 6 BC Que, 10 Que, 16, ?21 BC [964]; on affn. 1 BC [957]; on 9 Que [292].
- Dothidella adusta* (Fckl.) Lind (*Asterella chamaenerii* Rostr.): on 2, 7 Greenl [900]; on 7 Frank [604, 605], Greenl [899, p. 545; 901, 902].
- Endophyllum alaskanum* Savile: on 1 Alaska [964, p. 1393].
- Helotium cyathoides* (Bull. ex Fr.) Karst.: on 2 Alaska [176, 1038].
- H. herbarum* (Pers.) Fr.: on 2 Greenl [900].
- H. scutula* (Pers. ex Fr.) Karst.: on 7 Alaska [176, 1038].
- Heteropatella umbilicata* (Pers. ex Fr.) Jaap (*Septoria cercosperma* Rostr.): on 12 Greenl [900].
- Laestadia epilobii* (Wallr.) Sacc.: on 2 Greenl [899].
- Leptosphaeria doliolum* (Pers.) de Not.: on 4a Que [53]; on 7 Greenl [901].
- Marssonina chamaenerii* Rostr.: on 2, 7 Greenl [899, p. 576]; on 2 Greenl [902].
- Mollisia atrata* (Pers.) Karst.: on 2 Greenl [900].
- Monochaetia kriegiana* Bres. (*Hyaloceros kriegianum* (Bres.) Diet.): on *E. sp.* Alaska [175]; on living leaves of 2 Man [93, p. 131].
- Mycosphaerella chamaenerii* Savile (stat. conid. *Ramularia c.*, q.v.): on 7 Frank [964, p. 1388].
- M. minor* (Karst.) Johans. (*Sphaerella m.* Karst.): on 2 Greenl [900]; on 7 BC [50], Labr [52], Greenl [901].
- M. tassiana* (de Not.) Johans. (*M. pachyasca* (Rostr.) Vestergr., *Sphaerella p.* Rostr.): on 7 Frank [600, 903], Greenl [601; 603; 899, p. 552; 901, 902].
- M. tassiana* var. *arctica* (Rostr.) Barr: on *E. sp.* Labr, 7 Frank [52].
- M. tassiana* var. *tassiana*: on 7 Frank [52].
- Nectria cinnabarina* Tode ex Fr.: on 2 Alaska [175].
- N. pedicularis* (Tracy & Earle) Petr.: on 2 Que [53].
- Ovularia epilobina* Sacc. & Fautr.: on 7 Alaska [983]; doubtfully distinct from *Ramularia chamaenerii* (q.v.) [964].
- Paradidymella tosta* (Berk. & Br.) Petr. (*Didymella t.* (Berk. & Br.) Sacc.): on 2 Que [53], NS [1138].
- Phaeosphaerella sp.*: on 13 Alaska [1038].
- Phomatospora sp.*: on 2 Alaska [175].
- Pistillaria typhuloides* (Pk.) Burt: on 2 Alaska [1038], Man [93, p. 79].
- Plasmopara epilobii* (Rabh.) Schroet.: on 10 Alaska [964].
- P. latifolii* Savile: downy mildew, mildiou: on 7 Alaska Yukon BC Keew Que [964, p. 1387]; on 7, sub *P. epilobii*, Alaska [175, 1038], and sub *Peronospora arthuri* Farl., Alaska 43:112.
- Platyspora pentamera* (Karst.) Wehm. (*Pleospora platyspora* sensu Rostr.): on 8 Greenl [901].
- Pleospora arctica* Fckl. (non *P. arctica* Karst., *P. karstenii* Berl. & Vogl.): on 7 Frank [604], Greenl [601].
- P. helvetica* Niessl: on 7 Frank [52].
- P. herbarum* (Fr.) Rabh.: on *E. sp.* Labr, 7 Frank [52, 903], Greenl [899].
- P. penicillus* (Schm.) Fckl. var. *p.* (*Pyrenophora chrysospora* (Niessl) Sacc.): on 7 Frank [600].
- P. tragacanthae* Rabh.: on 7 Frank [52].
- Puccinia dioicae* P.Magn. (*P. extensicola* Plowr. var. *oenotherae* (Mont.) Arth., *P. ludibunda* Ell. & Ev.): 0 I on 2 Sask Man [93, p. 68; cf. 15, p. 199].
- P. epilobii* DC. (*Micropuccinia e.* (DC.) Rostr.): rust, rouille: III on 1 Que, 6 Greenl [15, p. 274]; on 1, 6 Greenl [604]; on 1, 2, 12 Greenl [902]; on 10a Ont [828].
- P. epilobii* ssp. *palustris* Urban: III on 10 BC Ont Que Keew Nfld [964].
- P. gigantea* Karst.: III on *E. sp.*, 2 Alaska [175]; on 2 BC [1198], Alta Man [15, p. 203], Man [93, p. 68], Alaska BC Alta Man Que [964].
- P. oenotherae* Vize: 0 I II III on 9 BC [15, p. 248].
- P. pulverulenta* Grev. (*P. vagans* Arth.): 0 I II III on *E. sp.*, 1, 4, 6, 7 Alaska [175]; on 1 Greenl [899]; on 4a Sask [93, p. 71]; on 11 BC [1198]; on 12 Greenl [900], [cf. 15, p. 313].
- P. scandica* Johans.: III on *E. sp.* BC [15, p. 314]; on ?1 BC, 1 Alaska BC Alta, also in Greenl, fide Jørstad, [964].
- P. veratri* Duby: 0 I on *E. sp.*, 1, 4a, 7 Alaska [175]; on 1 Alaska, 5, 7 BC [15, p. 273]; on 7 Alta, 8 BC [963]; also on *E. sp.*, 1 BC, 4a, 7 Alaska [964].
- Pucciniastrum epilobii* Otth (*P. abieti-chamaenerii* Kleb.): rust, rouille du sapin: II III on 2, 7, section Chamaenerion (Ludw.) Tausch, Alaska [175]; on 2 Alaska BC Alta Sask Man NWT NB NS, 7 Alaska [15, p. 15]; on 2 Alta Sask Man Ont [93, p. 63], Que [197], NS PEI [1138], Nfld F53:26; on 2 Alaska Yukon Mack BC Alta Sask Ont Que Labr

NS Nfld, 7 Que [964]; ? on *E. sp.* Alaska [175], Mack 40:101.

Pucciniastrum pustulatum Diet. (*P. epilobii* sensu lat.): II III on 1, 4, 10, section Lysimachion Tausch, Alaska [175]; on 1, 15 BC [1198]; on 3 Que, 4a Alaska BC Alta Sask Ont Que NS PEI Nfld, 4b Que, 5 Ont, 10 Alaska BC Sask Man Ont Que Nfld, 8 BC, 22 cult. from inoculum from 5 Ont [964]. First to demonstrate that the rust on 4a develops its 0 I on *Abies balsamea*, Faull [290] also showed that the rust (*P. epilobii*) from 2 develops its aecia on *A. balsamea* more rapidly than does the rust from 4a. From differences in teliospore development, Pady [816] recognized the two species. For differences in the spore states of the two rusts see [290, 964].

Pythium debaryanum Hesse: on 7 Alaska [1038].

Ramularia chamaenerii Rostr.: on 7 BC Frank Keew Que [964], Greenl [899, 900].

R. montana Speg. (*R. cercosporoides* Ell. & Ev., *R. punctiformis* (Schlecht.) Höhn. non *R. p.* Sacc.): on *E. sp.*, 2 Alaska [175]; on 2, 6, 13 Alaska [1038]; on 2 BC [535], Man [93, p. 124]; on 2 Alaska Yukon BC Alta Sask Ont Que, 3 Que, 4a Ont Que, 6 Alaska BC Que Greenl, 10 Alaska Keew Man, 11 BC [964]; on 4a Man [93, 125]; for additional synonyms see [964].

Septoria epilobii West.: on *E. sp.* Alaska [175]; on 13 Alaska [983]; on 19 Alaska [1038].

Sphaerella effusa Sacc. & Syd.: on *E. sp.*, 2, 6, 14 Alaska [175].

S. microspila (Berk. & Br.) Cke.: on 2 BC [50], Greenl [899].

Sphaerotheca macularis (Wallr. ex Fr.) Magn. (*S. humuli* (DC.) Burr.): on 1, 7, 13 Alaska [1038]; on 4, 6 Alaska [175]; on 4a Man [93, p. 44]; on 4a Que, 10 Man Labr Nfld, 20 Labr [964].

Sydowiella fenestrans (Duby) Petr. (*Didymosphaeria f.* (Duby) Wint., *Gnomonia f.* (Duby) Sacc.): on *E. sp.* Alaska [1038]; on 2 BC [50], Que [53], Greenl [900]; on 7 Greenl [899].

Synchytrium ? aureum Schroet.: on 1 Que, 10, 17 Keew [964]; on 7 Frank [971]; on 10 Mack [541].

Torula herbarum Lk.: on 7 Greenl [902].

Trochila epilobii Karst.: on 2 Greenl [900, 902].

Venturia maculiformis (Desm.) Wint.: on 2 Que, 7 Frank [52].

Equisetum L.

EQUISETACEAE

Rushlike plants with perennial rhizomes, nearly cosmopolitan.

1. *E. arvense* L., common or field horsetail, queue de renard; Greenl to Alaska south to Nfld and NS, also in Eurasia.

2. *E. sylvaticum* L.; Greenl, Labr and Nfld to Alaska, also in Eurasia.

3. *E. variegatum* Schleich.; arctic N. America s. to US, also in Eurasia.

Other host: 4, *E. laevigatum* A.Br.

Ascochyta equiseti Grove: on 4 Alaska [983].

Fusarium semitectum Berk. & Rav.: on 1 Alaska [1038].

Helotium cyathodeum (Bull. ex Fr.) Karst.: on ?3 Alaska [176]; on 3 Alaska [1038].

Leptosphaeria equiseti Karst.: on 3 Greenl [603].

L. hiemalis Sacc.: on 1 Frank [52].

Mycosphaerella tassiana (de Not.) Johans.: on 1 Greenl [602].

Pezizella inquilina (Karst.) Rehm: on old stems of *E. sp.* Man [93, p. 41].

Phoma equiseti Desm.: on 1 NS [1138].

Stamnaria persoonii (Moug. ap. Pers. ex Fr.) Fckl.: on *E. sp.* Alaska [182]; on 3 Alaska [1038].

Titaeospora detospora (Sacc.) Bubák: on *E. sp.* Sask, 2 Man [93, p. 131].

Eragrostis Beauv.

GRAMINEAE

Annual or perennial grasses of warm-temperate and tropical regions.

1. *E. pilosa* (L.) Beauv.; naturalized from Europe in Que; infrequent.

2. *E. poaeoides* Beauv. (*E. minor* Host), amour-ette; naturalized from Europe. A weed along railway tracks and rapidly spreading throughout Canada.

Chaetomium globosum Kze.: on *E. sp.* Que [1009].

Claviceps purpurea (Fr.) Tul.: 1, 2 artificially infected with cultures from rye [172].

Eranthis Salisb.

RANUNCULACEAE

Herbs with tuberous perennial rootstocks, native to Europe and Asia.

1. *E. hyemalis* (L.) Salisb., winter aconite, fleur d'hiver; spread locally from cult. in the US, native to Europe. 1a, *E. h.* var. *cilicica* (Schott & Kotschy) Huth (*E. cilicica* S. & K.); native to Asia Minor.

Urocystis eranthisidis (Pass.) Ainsw. & Sampson (*Tuber-cinia 'eranthis'* (Pass.) Liro): smut, charbon: on 1a BC 45:112, [292].

Erigenia Nutt.

UMBELLIFERAE

A small glabrous vernal plant, native to N. America.

1. *E. bulbosa* (Michx.) Nutt., pepper-and-salt; in Canada in s. Ont.

Puccinia erigeniae (Orton) Arth.: 0 I III on 1 Ont [15, p. 315; cf. 828].

Erigeron L.

COMPOSITAE

Herbaceous plants scattered over the world, particularly in temperate and mountainous regions; several cult. as border plants.

1. *E. annuus* (L.) Pers., daisy fleabane, verger-ette annuelle; native, from Nfld and NS to BC.

Erigeron

2. *E. canadensis* L., horse weed, fausse camomille, vergerette du Canada; native, common across Canada.
 3. *E. compositus* Pursh; Que, Greenl, arctic Canada, Alaska and BC.
 4. *E. eriocephalus* (*E. uniflorus* sensu Simmons); arctic N. America, Labr, Que and BC; also w. Europe and e. Asia.
 5. *E. grandiflorus* Hook.; alpine and arctic western N. America.
 6. *E. humilis* Grah. (*E. unalaschkensis* (DC.) Vierh.); subarctic and alpine regions, Alaska to Greenl and Labr, Que and BC.
 7. *E. karvinskianus* DC. (*E. mucronatus* DC.); native to Central America.
 8. *E. peregrinus* (Pursh) Greene; Alaska, BC and Alta and into the US. 8a, *E. p.* ssp. *callianthemus* (Greene) Cronq.; Alaska, BC, Alta and US.
 9. *E. philadelphicus* L.; Nfld and NS to BC and into the US.
 10. *E. speciosus* (Lindl.) DC.; Alta, BC and south into the US.
- Other hosts: 11, *E. filifolius* (Hook.) Nutt. 12, *E. linearis* (Hook.) Piper. 13, *E. neglectus* Kern.

- Botrytis cinerea* Pers.: on *E.* sp. Alaska [175].
Coleosporium asterum (Diet.) Syd. (*C. solidaginis* Thüm.): II III on 8 Alaska [15, p. 44; 175].
Entyloma compositarum Farl.: on 1 Ont [946]; on 1 Sask Man Ont, 6 NWT [292]; on 6 Keew [953], Labr [957].
Gloeosporium roaldii Lind: on 5 Yukon [600, p. 20].
Laestadia circumtegens Rostr.: on 11 Greenl [899].
Leptosphaeria agnita (Desm.) Ces. & de Not.: on 10 BC [50].
Mycosphaerella confinis (Karst.) Lind (*Sphaerella c.* Karst.): on 3 Mack [604]; on 4 Greenl [901].
M. eriophila (Niessl) Dearn. (*Sphaerella e.* Niessl): on *E.* sp. BC [50]; on 3 Mack [250], Greenl [899].
M. taraxaci (Karst.) Lind: on 3 Frank [52].
M. tassiana (de Not.) Johans.: on *E.* spp. BC [50].
M. tassiana var. *arctica* (Rostr.) Barr: on 4 Frank [52].
Ophiobolus fulgidus (Cke. & Pk.) Sacc.: on old stems of *E.* sp. Man [93, p. 55].
Phoma complanata (Tode ex Fr.) Desm.: on 4 Greenl [901].
Platyspora pentamera (Karst.) Wehm. (*Pleospora platyspora* sensu Rostr.): on 3 Greenl [899].
Pleospora ambigua (Berl. & Bres.) Wehm.: on 3 Frank [52].
P. cerastii Oud. (*Pyrenophora c.* (Oud.) Lind): on 11 Greenl [603].
P. chlamydospora Sacc. var. *c.* (*P. balsamorhizae* Tracy & Earle): on 11 BC [50].
P. comata Auersw. & Niessl: on *E.* spp. BC [50]; on 4 Frank [52].
P. helvetica Niessl: on 3 Frank, 4 Frank Labr [52].
P. herbarum (Fr.) Rabh.: on *E.* sp. BC [50]; on 3, 4

Greenl [899]; on 11 Greenl [602]; on 13 Greenl [902].

- P. njeusensis* Bubák: on 3 BC [50].
P. penicillus (Schm.) Fckl. var. *p.* (*P. chrysospora* Niessl, *Pyrenophora c.* (Niessl) Sacc.): on 3 Greenl [601, 602, 603]; on 4 Greenl [901].
P. phaeocomoides (Berk. & Br.) Wint. (*P. vulgaris* Niessl, *P. v.* var. *ferruginea* Wehm., nom nud.): on *E.* sp. BC [50]; on 3 Mack [250].
P. phaeocomoides var. *infectoria* (Fckl.) Wehm. (*P. i.* Fckl.): on 3 Greenl [602, 603].
P. rainierensis Wehm. (*P. asymmetrica* Wehm.): on *E.* sp. BC [50].
P. scrophulariae (Desm.) Höhn.: on 4 Frank [52].
P. scrophulariae var. *compositarum* (Earle) Wehm. (*P. c.* Earle): on *E.* spp. BC [50].
P. tragacanthae Rabh.: on *E.* spp. BC [50]; on 4 Frank [52].
Puccinia dioicae P.Magn.: 0 I on 8 Alaska [175]; on 8a BC [13]; on 9 Ont [828], [cf. 15, p. 197].
P. stipae Arth.: 0 I on 12 BC [1198].
Pyrenophora sp.: on 3 Frank [250].
Selenophoma drabae (Fckl.) Petr. (*Rabdospora d.* (Fckl.) Berl. & Vogl.): on 5 Yukon [600].
Septoria Perigeronetea Sacc.: on 2 Man [93, p. 138].
Torula abbreviata Cke.: 11 Greenl [899].
Aster yellows virus (callistephus virus 1): aster yellows, jaunisse de l'aster: on 2 NB 32:101; on 7 NB 51:113.

Eriogonum Michx.

POLYGONACEAE

Annual or perennial herbs, native mostly to w. N. America.

1. *E. flavum* Nutt.; BC to Man.
 2. *E. heracleoides* Nutt.; BC to Mont and Calif.
- Leptosphaerulina pulchra* (Wint.) Barr (*Pleospora oligasca* Bubák): on *E.* spp. BC [50].
Mycosphaerella polygonorum (Crié) Lind: on 2 BC [50].
M. punctiformis (Pers. ex Fr.) Starb. var. *clematidis* Jaap: on *E.* sp. BC [50].
Uromyces intricatus Cke.: 0 I III on 1 Sask [93, p. 72]; on 2 BC [1198], [cf. 15, p. 229].

Eriophorum L.

CYPERACEAE

The cotton grasses, les linaigrettes, rushlike plants with a perianth of numerous silky bristles, native to arctic and temperate regions of N. America and Eurasia.

1. *E. angustifolium* Honcheny (*E. ?polystachyum* auct., non L.), cotton grass, herbe à coton; circumpolar.
2. *E. chamissonis* C.A.Mey.; Labr to Alaska and in Nfld, NS, NB and Ont; also in Eurasia.
3. *E. scheuchzeri* Hoppe; Greenl, Nfld to Alaska; also in Eurasia.
4. *E. spissum* Fern. (*E. vaginatum* L. var. *spissum* inedit.); Nfld and NS to Alaska.
5. *E. tenellum* Nutt.; Labr and NS to Ont.

6. *E. virginicum* L., including 6a, *E. v. f. album* (Gray) Wieg.; Labr and NS to Ont.
7. *E. viridicarinatum* (Engel.) Fern.; Labr, Nfld and NS to BC and Alaska.

Other host: 8, *E. triste* (Th. Fries) Hadáč & Löve.

- Belonidium junicisedum* (Karst.) Rehm (*Mollisia juniciseda* Karst.): on 1 Greenl [899].
- Boloniella cymbispora* (Rostr.) Lind (*Mollisia c. Rostr.*): on ?1 Greenl [602]; on 1, 3 Greenl [899].
- Belonopeziza advena* (Karst.) Nannf. (*Mollisia a. Karst., Niptera a. (Karst.) Lind*): on 1 Alaska, 3 Frank [604]; on ?1, 3 Frank [600]; on ?1 Greenl [601]; on 3 Greenl [603].
- Hysteropezizella ignobolis* (Karst.) Lind (*Trochila i. Karst.*): on 1 Greenl [899].
- Leptosphaeria carcinella* Karst.: on 1, 3 Frank [52]; on ?1 Keew [604].
- L. eustoma* (Fckl.) Sacc.: on 8 Frank [52].
- L. microscopica* Karst.: on ?1 Greenl [602], Frank [604, 899]; on 3 Greenl [905].
- Mycosphaerella minor* (Karst.) Johans.: on 1 Que [53].
- M. perexigua* (Karst.) Johans. (*Sphaerella p. Karst.*): on 1 Greenl [604, 899].
- M. recutita* (Fr.) Johans.: on *E. sp.* Que, 4 Labr [52].
- M. tassiana* (de Not.) Johans. (*Sphaerella t. de Not.*): on ?1, 3 Frank [604], Greenl [602, 603]; on ?1 Frank [604]; on 3 Frank [600], Greenl [601].
- M. tassiana* var. *arctica* (Rostr.) Barr: on 3 Frank [52].
- M. tassiana* var. *tassiana*: on 8 Frank [52].
- M. wichuriana* (Schroet.) Johans. (*Sphaerella w. Schroet.*): on 1 Greenl [899]; on ?1 Frank [903]; on 4 Yukon [600].
- Niptera melatephra* (Lasch) Rehm: on ?1 Frank [903].
- Platyspora pentamera* (Karst.) Wehm. (*Clathrospora p. (Karst.) Berl.*): on ?1 Greenl [603].
- Pleospora scrophulariae* (Desm.) Höhn.: on 3 Frank [604].
- Puccinia angustata* Pk.: II III on 1 Sask [93, p. 65]; on 5, 6a Ont [828]; on 7 BC [15, p. 195].
- Sclerotinia dennisii* Svrcek: on 3 Frank, very close to *S. vahliana* [971].
- S. vahliana* Rostr.: on 3 Frank [903, 971], Greenl [900, p. 607]; on ?3 Alaska [175].
- Selenophoma drabae* (Fckl.) Petr. (*Rhabdospora d. (Fckl.) Berl. & Vogl.*): on ?1 Frank [604]; on ?1, 3 Greenl [603].
- Septoria chamissonis* Sacc. & Scalia: on 2 Alaska [175].
- S. eriophori* Oud.: on 4 Alaska [175, 604]; on ?1 Greenl [903].
- Stagonospora eriophorella* (Sacc. & Scalia) Lind: on 2 Alaska [175].
- Stilbum simmonsii* Rostr.: on ?1 Frank [903].
- Wettsteinina macrotheca* (Rostr.) Barr and *W. niesslii* Müll.: on 1 Que [53].

Erysimum L.

CRUCIFERAE

Annual, biennial or perennial herbs, native to Europe, Asia and N. America.

1. *E. allionii* Hort. (*Cheiranthus a. Hort.*); cult., but origin unknown.

2. *E. cheiranthoides* L., wormseed mustard, herbe aux chantres; probably naturalized from the Old World in the agricultural districts of all provinces of Canada; also in Mack and Yukon.
3. *E. inconspicuum* (Wats.) MacM.; abundant in Western Canada, but also known in Eastern Canada.
4. *E. pallasii* (Pursh) Fern. (*Hesperis p. Pursh*); in the high arctic, Greenl to Alaska, s. to Alta; circumpolar.

Albugo cruciferarum S.F.Gray (*Cystopus candidus* (Pers. ex. Lév.) de Bary): white rust, albugine: on *E. sp. cult.*, heavy, Ont 45:112.

Botrytis cinerea Pers.: gray mold, moisissure grise: on 1 BC 43:105.

Cladosporium herbarum Lk.: on 4 Yukon [600].

Mycosphaerella tassiana (de Not.) Johans.: on 4 Greenl [602, 603].

Peronospora parasitica (Pers. ex Fr.) Fr. (*P. erysimi* Gäum.): downy mildew, mildiou: on 2 Man 24:78, [93, p. 30].

Phoma complanata (Tode ex Fr.) Desm.: on 4 Greenl [602].

P. herbarum West.: on 3 Mack [250].

Plasmodiophora brassicae Wor.: club root, hernie: on 2 PEI 50:93.

Pleospora androsaces Fckl. (*Pyrenophora a. (Fckl.) Sacc.*): on 4 Greenl [603].

P. cerastii Oud. (*Pyrenophora c. (Oud.) Lind*): on 4 Greenl [603].

P. comata Auersw. & Niessl (*Pyrenophora c. (Niessl) Sacc.*): on 4 Greenl [603].

P. herbarum (Fr.) Rabh.: on 4 Mack [250].

P. penicillus (Schw.) Fckl. var. *p.* (*Pyrenophora chrysospora* (Niessl) Sacc.): on 4 Greenl [602].

Puccinia aristidae Tracy: 0 I on 2 Sask 24:78, [93, p. 66; cf. 15, p. 157].

P. holboellii (Horn.) Rostr. (*P. thlaspoes* auct. non Schub.): III on 4 Mack Frank Greenl [971; 15, p. 149], Greenl [603].

Erythronium L.

LILIACEAE

Low herbs from deep-seated corms, mostly native to temperate N. America, one species in Eurasia.

1. *E. americanum* Ker, dogtooth violet, ail doux; in Canada in NS and from NB to Ont.
2. *E. grandiflorum* Pursh, Adam and Eve; in Canada in BC and Alta.
3. *E. oregonum* Applegate; BC and into the US.
4. *E. revolutum* J.E.Sm.; BC to Calif.

Botrytis ?tulipae (Lib.) Lind: blight, brûlure: on 2 BC 47:108.

Ciborinia erythronii (Whetz.) Whetz.: on *E. sp.* Ont Que [378]; on 1 Que [60].

Ditylenchus dipsaci (Kühn) Filipjev: bulb and stem nematode, pourridié nématique: cause of brown ring or leaf 'spikkel' of 2 BC [535].

Puccinia sessilis Schneid. ex Schroet.: 0 I on 1 Ont [828; cf. 15, p. 130].

Erythronium

- Urocystis erythronii* Clint.: on 1 Ont Que [292; cf. 963].
Uromyces heterodermus Syd.: rust, rouille: 0 III on 2 BC 35:67, [15, p. 278; 535]; on 2, 3, 4 BC [963]; on 3 BC [1198].
Ustilago heufleri Fekl.: on 1 Ont 33:112, Que 29:75, Ont Que [292]; on 1 Ont Que, 3 BC [963].

Eschscholtzia Cham. PAPAVERACEAE

Annual or perennial herbs native to w. N. America, widely cult. for their showy flowers.

1. *E. californica* Cham., California poppy, globe du soleil; native to Calif and Oregon; cult. as an annual; rarely escaped in PEI Man BC.

Botrytis cinerea Pers.: on 1 Alaska [175].

Aster yellows virus (callistephus virus 1): aster yellows, jaunisse de l'aster: on 1 Man 44:108, NB 47:108.

Euonymus L. CELASTRACEAE

Usually upright trees or shrubs, native to N. and Central America and Europe, also Australia; cult. for their attractive foliage and fruit.

1. *E. alatus* (Thunb.) Sieb., winged spindle tree, fusain; native to China and Japan.
2. *E. fortunei* (Turcz.) Hand.-Mazz.; native to China. 2a, *E. f.* var. *vegetus* (Rehd.) Rehd.; native to Japan.

Agrobacterium tumefaciens (Sm. & Towns.) Conn: crown gall, tumeur du collet: on 2a Ont 50:114.

Diplodia ramulicola Desm.: twig blight, brûlure des rameaux: on 1 BC 40:92, [1198].

Fusarium acuminatum Ell. & Ev. and *F. lateritium* Nees: isolated from branches of 1 affected by dieback BC [335].

Microsphaera penicillata (Wallr. ex Fr.) Lév. (*M. alni* (Wallr.) Wint.): powdery mildew, blanc: on *E.* sp. PEI 26:36.

Tubercularia vulgaris Tode: on 1 Ont 56:126.

Eupatorium L. COMPOSITAE

Perennial, or annual, herbs or shrubs, mainly of Mexico, the West Indies and tropical S. America; cult. in the greenhouse or for the hardy border.

1. *E. maculatum* L. (*E. purpureum* L. var. *maculatum* (L.) Darl.), joe-pye weed; in Canada in Nfld and from Que to BC.
2. *E. perfoliatum* L., thoroughwort or boneset, herbe à sonder; in Canada in NS and from Que to Man.
3. *E. purpureum* L.; unrecorded in Canada; apparently host so identified is actually 1.
4. *E. rugosum* Houtt. (*E. urticaefolium* Reichard), white snakeroot; in Canada in NB and from Que to Sask.

Erysiphe cichoracearum DC. ex Mérat: on 2, 3 NS [1138]; on 3 Que 32:102, PEI 30:95.

Puccinia eleocharidis Arth.: 0 I on 1 Man [93, p. 67]; on 2, 3 Ont NS [15, p. 193]; on 2, 3, 4 Ont [828]; on 4 Que 33:112, [cf. 1138].

P. tenuis Burr.: 0 I III on 4 Ont [828; cf. 15, p. 264].

Euphorbia L. EUPHORBIACEAE

Upright or prostrate herbs or shrubs with milky acrid juice, mostly in temperate regions; some planted in the open or under glass while others are more or less serious weeds. Gray's Manual places 4, 5, 7, 11 and 12 in the subgenus *Chamaesyce*, 1 and 9 in *Esula* and 2 and 10 in *Poinsettia*.

1. *E. cyparissias* L., cypress spurge, petit cyprès; native to Europe, originally cult., but now a perennial weed common in s. Ont and e. Que and rare elsewhere in Canada.
2. *E. dentata* Michx.; native to the US, but apparently an adventive to Ont.
3. *E. epithymoides* L., native to e. Europe, cult.
4. *E. glyptosperma* Engelm.; common annual in Canada particularly in the west; possibly not distinct from 11.
5. *E. humistrata* Engelm.; unknown in Canada, probably a misdetermination.
6. *E. lactea* Haw.; native to the West Indies, widely cult. in tropical America.
7. *E. maculata* L.; adventive to s. Ont from the US.
8. *E. milii* Ch. des Moulins (*E. splendens* Hook.), crown-of-thorns, couronne d'épines; native to Madagascar.
9. *E. peplus* L., leafy spurge; a major weed in Western Canada; also in s. Ont and eastward.
10. *E. pulcherrima* Willd., poinsettia, poinsettia; native to Mexico and Central America, a popular greenhouse winter-flowering shrub.
11. *E. serpyllifolia* Pers.; a common annual weed in Canada, especially in the west.
12. *E. vermiculata* Raf. (*E. hirsuta* (Torr.) Wieg.); in Canada in NS and Que and apparently elsewhere.

?*Agrobacterium tumefaciens* (Sm. & Towns.) Conn: crown gall, tumeur du collet: reported on 8 Man 59:88.

Alternaria tenuis auct. sensu Wiltshire: cause of a leaf spot on 9 BC [535].

Botrytis cinerea Pers.: on 10 Alaska [175].

Coniothyrium euphorbiae (Roum.) Berl. & Vogl.: stem rot, pourriture coniothyrienne: on 6 Que 45:112.

Melampsora euphorbiae (Schub.) Cast.: 0 I II III on 1 Ont [828], NS PEI [1138; cf. 15, p. 57].

M. euphorbiae-gerardianae W.Müll.: II III on 9 BC [1198].

- Melampsora monticola* Mains: II III on 9 BC [535].
- Pythium* spp.: collar or stem rot, pourridié pythien: on 10 greenhouse Ont 52:113 et seq.; usually not serious.
- Rhizoctonia solani* Kühn: stem rot, rhizoctone commun: on cuttings of 10 Ont 56:126, 57:125.
- Uromyces euphorbiae* Cke. & Pk. (*U. proëminens* Pass.): 0 I II III on 2, 4, 5, 7, 11, 12 Ont [828]; on 4 Sask. 11 Man [93, p. 73]; on 5 Ont, 11 BC, 12 Ont [15, p. 309].
- U. striatus* Schroet. (*U. medicaginis* Pass.): 0 I on 1 Ont [828]; first reported in Ont 47:24, [cf. 15, p. 299].

Euphrasia Lange SCROPHULARIACEAE

Annual herbs of cool or temperate regions.

1. *E. arctica* Lange in Rostr. *E. officinalis* auct. non L.); in arctic eastern Canada, Greenl and in Europe.
2. *E. subarctica* Raup; Alaska and Yukon.

Cylindrocarpon ehrenbergii Wr.: on stems of 2 Alaska [483, 1038].

Phoma herbarum West.: on 1 Greenl [900].

Pleospora herbarum (Fr.) Rabh.: on 1 Greenl [900].

Eutrema R.Br. CRUCIFERAE

Arctic and alpine perennial herbs.

1. *E. edwardsii* R.Br.; Alaska, arctic Canada and Greenl; circumpolar.

Fusicolla corticalis Karst.: on 1 Greenl [602].

Mycosphaerella confinis (Karst.) Lind: on 1 Frank [604].

M. cruciferarum (Fr.) Lindau (*Sphaerella c.* Fr.): on 1 Frank [52], Greenl [899].

M. tassiana (de Not.) Johans. (*M. pachyasca* (Rostr.) Vestergr., *Sphaerella p.* Rostr.): on 1 Frank [600, 903], Greenl [602].

M. tassiana var. *arctica* (Rostr.) Barr: on 1 Frank [52].

Peronospora parasitica (Pers. ex Fr.) Fr.: on 1 Frank [959].

Pleospora comata Auersw. & Niessl (*Pyrenophora c.* (Niessl) Sacc.): on 1 Frank [52, 604].

P. herbarum (Fr.) Rabh.: on 1 Keew 33:112.

P. penicillus (Schm.) Fckl. var. *p.* (*Pyrenophora chrysospora* (Niessl) Sacc.): on 1 Frank [604].

Puccinia eutremae Lindr.: on 1 Frank Que [605; cf. 15, p. 291].

Selenophoma drabae (Fckl.) Petr. (*Rhabdospora groenlandica* Lind, *Septoria semilunaris* Johans.): on 1 Greenl [601], Frank [903].

Exochorda Lindl. ROSACEAE

Handsome deciduous shrubs from central Asia to Korea.

1. *E. racemosa* (Lindl.) Rehd.; native to China.
- Nectria cinnabarina* Tode ex Fr.: on dead bush of 1 NS 53:106.

Fagopyrum Mill. POLYGONACEAE

Annual or perennial herbs of Europe and Asia.

1. *F. esculentum* Moench, (*F. sagittatum* Gilib.), common buckwheat, sarrasin; probably native to central and n. Asia; much cult.
2. *F. tataricum* (L.) Gaertn., Tartary buckwheat, sarrasin de Tartarie; native to India; cult. extensively in Eastern Canada, particularly NB but also a serious weed in Alta and parts of Man.

Ramularia rufomaculans Pk.: on 1 Que 25:18, 29:24.

Ustilago reticulata Liro (*U. utriculosa* auct.): smutted plants of *Polygonum ?scabrum* growing in a crop of 1 caused the seed to be "smutty" Que 40:22.

Aster yellows virus (callistephus virus 1): aster yellows, jaunisse de l'aster: on 1, 2 NB 37:17; on 1 Man 57:15, Ont 39:28, NS 60:99, PEI 40:23. The level of infection was higher in 2 than 1 in plots at Fredericton, NB 38:21. The virus was transmitted experimentally from buckwheat to *Callistephus* by means of the leafhopper *Macrostes fascifrons* Stål (*M. divisus* auct.), 41:19.

Fagus L. FAGACEAE

Trees of the northern hemisphere.

1. *F. grandifolia* Ehr. (*F. americana* Sweet, *F. ferruginea* Ait.), beech or American beech, hêtre; in Canada from PEI to s. Ont. The wood is used for flooring, furniture, railway ties, cooperage, etc.
2. *F. sylvatica* L., European beech, hêtre; native from central and s. Europe to the Crimea. It occurs in numerous cultivars, but is little planted in Canada.

Arcyria incarnata Pers.: on 1 NS [1198].

Ascotremella faginea (Pk.) Seav.: on 1 Ont F58:59, [979].

A. turbinata Seav.: on *F.* sp. Que 31:126.

Asterosporium asterospermum (Pers. ex S.F.Gray) Hughes (*A. hoffmanni* Kze. ex Wallr.): on bark of 1 Ont F59:65, NS [1138].

Badhamia decipiens (Curt.) Berk.: on bark of 1 NS [1138].

Botryosphaeria fuliginosa (Moug. & Nestl.) Ell. & Ev.: on 1 NS [1138], the fungus is probably *B. quercuum* (Schw.) Sacc.

Botrytis sp.: cause of seedling blight of 1 PEI 26:30, 30:78.

Calocera cornea (Batsch ex Fr.) Loudon: on 1 NS [1138].

Cheirosphaeria botryospora (Mont.) Hughes (*Thyrsidium botryosporum* (Mont.) Mont.: on 1 NS [1138].

Chlorosplenium aeruginosum (Oeder ex S.F.Gray) de Not. (*Chlorociboria aeruginosa* (Oeder) Seav.): on rotten wood of 1 NB NS [1138].

Clitocybe leptoloma Pk.: on 1 NS [1138].

Fagus

- Coccomyces coronatus* (Schum.) de Not.: on dead leaves of 1 NS [1138].
- Conoplea sphaerica* (Pers.) Pers.: on *F.* sp. Ont Que [484].
- Corticium vellereum* Ell. & Cragin: on 1 NS [1138].
- Coryne sarcoides* (Jacq. ex Fr.) Tul.: on 1 NS [1138].
- Crepidotus applanatus* (Fr.) Karst.: on logs of 1 NS [1138].
- C. stipitatus* Kauff.: on debris of 1 NS [1138].
- C. versutus* Pk.: on 1 NS [1138].
- Cryptodiaporthe galericulata* (Tul.) Wehm.: on 1 NS [1138].
- Cudonia lutea* (Fr.) Sacc.: on leaves of 1 NS [1138].
- Cytosporina* sp.: on *F.* sp. Ont 48:97.
- Dacrymyces deliquescens* Bull. ex Duby: on log of 1 NS [1138].
- Daedalea confragosa* Bolt. ex Fr.: from 1 Que [791]; on 1 NS [1138].
- D. unicolor* Bull. ex Fr.: on 1 NS [1138]; associated with the wood wasp, *Tremex columba* L., on 1 NB [1058]; see *Acer*.
- Diatrype stigma* Hoffm. ex Fr.: on 1 NB F53:24.
- D. virescens* (Schw.) Rav.: on 1 Ont F59:65.
- Diatrypella nigro-annulata* (Grev.) Nit.: on 1 NS [1138].
- Dichaena faginea* (Pers.) Fr.: on bark of living 1 NS [1138].
- Diderma spumarioides* Fr.: on dead leaves and bark of 1 NS [1138].
- Didymium minus* Morgan: reported on 1 NS [1138].
- Eutypa spinosa* (Pers.) Tul.: on weathered wood of 1 NS [1138].
- Exidia glandulosa* Bull. ex Fr.: on 1 NB NS PEI [1138].
- Favolus alveolaris* (DC. ex Fr.) Quél. (*F. canadensis* Klotsch): on 1 NS [1138].
- Femsjonina luteo-alba* Fr.: on 1 NS [1138].
- Fomes everhartii* (Ell. & Gall.) Schrenk & Spauld.: causes of soft white, or yellow, flaky heart rot of broad-leaved trees: on 1 Que; for culture characteristics see Nobles [791].
- F. fomentarius* (L. ex Fr.) Kickx: white mottled rot, carie blanche madrée: on dead 1 Ont F55:62, NS PEI [1138]; from 1 NS 50:115.
- F. ignarius* (L. ex Fr.) Kickx: white trunk rot, carie blanche du tronc: on 1 Ont F51:135, Que F53:49, NB NS F54:72, NS [1138], PEI 29:60.
- F. pini* (Brot. ex Fr.) Karst.: on 1 NS [1138].
- F. pinicola* (Swartz ex Fr.) Cke.: on 1 Que [740].
- Ganoderma applanatum* (Pers. ex Wallr.) Pat. (*Fomes applanatus* (Pers. ex Wallr.) Gill.): white mottled rot, carie blanche madrée: reported on 1 NS [1138].
- Gloeosporium fagi* Rob. & Desm. [*Discula quercina* (West.) Arx]: on 1 Ont 24:64, probably the fungus is *G. fagicola* (q.v.).
- G. fagicola* Pass. [*Discula quercina* (West.) Arx]: leaf spot, anthracnose: on 1 Ont NB 56:119, Que 59:82, NB NS F56:26.
- Helotium epiphyllum* (Pers.) Fr.: on leaves of 1 NS [1138].
- Hemitrichia stipitata* (Masse) Macbr.: reported on decayed 1 NS [1138].
- Hericium coralloides* (Scop. ex Fr.) Pers.: white spongy rot, carie blanche spongieuse: on 1 NS [1138].
- H. ramosum* (Bull. ex Mérat) Letellier (*H. laciniatum* Leers ex Banker): white spongy rot, carie blanche spongieuse: on 1 NS [1138].
- Heterochaetella dubia* (Bourd. & Galz.) Bourd. & Galz.: on 1 Ont [619].
- Hyaloscypha dematiicola* (Berk. & Br.) Nannf. and stat. conid., *Haplographium delicatulum* Berk. & Br.: on 1 Que [479].
- Hydnochaete olivacea* (Schw.) Banker: on twigs of 1 NS [1138].
- Hymenochaete badioferruginea* (Mont.) Lév. and *H. corrugata* (Fr.) Lév.: on branches of 1 NS [1138].
- H. corticolor* Berk. & Rav.: on 1 NS [1138].
- H. tabacina* (Sow. ex Fr.) Lév.: on 1 BC [1198], NB NS F53:24.
- Hypocrea patella* Cke. & Pk.: on decayed log of 1 NS [1138].
- H. rufa* (Pers.) Fr.: on 1 NS [1138].
- Hypoxylon cohaerens* Pers. ex Fr.: canker, chancre hypoxylonien: on 1 Que 33:112, 34:72, NB F53:24, NS [1138], PEI 33:61.
- H. deustum* (Hoffm. ex Fr.) Grev. (*Ustilina vulgaris* Tul.): brittle white heart rot, carie blanche friable: from 1 NS 50:115.
- H. enteromelum* (Schw.) Berk.: reported on 1 NS; may be *H. fragiforme* (q.v.) [1138].
- H. fragiforme* (Pers. ex Fr.) Kickx (*H. coccineum* Bull. ex Fr.): on 1 NB NS [1138].
- Hysterographium mori* (Schw.) Rehm: on 1 NS [1138].
- Hysteropatella minor* (Cke.) Rehm: on decorticated 1 NS [1138].
- Lachnella tricolor* (Sow.) Phill. var. *microspora* Kanouse: on decorticated areas of 1 NS [1138].
- Lachnum virgineum* (Batsch) Karst.: on bark and decayed wood of 1 NS [1138].
- Lentinus cochleatus* Fr.: on stumps of 1 NS [1138].
- Lenzites betulina* (L. ex Fr.) Fr.: from 1 Que [791]; on 1 NS [1138].
- Libertella* sp.: on 2 Ont F58:59.
- L. faginata* Desm.: on 1 NB F53:25.
- Lopadostoma turgidum* (Pers. ex Fr.) Trav.: on 1 Ont F62:70.
- Lycoperdon subincarnatum* Pk.: on log of 1 NS [1138].
- Merulius porinoides* Fr.: on *F.* sp. NS [1138].
- M. tremellosus* Schrad. ex Fr.: on 1 NS [1138].
- Microsphaera penicillata* (Wallr. ex Fr.) Lév. (*M. alni* (Wallr.) Salm.): on 1 NS [1138].
- Mollisia cinerea* (Batsch) Karst.: on decayed wood of 1 NS [1138].
- Mycena atro-umbinata* Pk. and *M. leaiana* (Berk.) Sacc.: on logs of 1 NS [1138].
- Mycosphaerella punctiformis* (Pers. ex Fr.) Starb.: on leaves of 1 Ont F63:70, NS [1138].
- Naematoloma sublateralitium* (Fr.) Karst. (*Hypholoma s.* (Fr.) Quél.): at base of old stumps, particularly 1 NS [1138].
- Nectria coccinea* Pers. ex Fr. var. *faginata* Lohm., Wats. & Ayers: In association with the beech scale, *Cryptococcus fagi* (Baer), it causes the destructive beech canker, maladie corticale du hêtre, NB 32:82, NS 30:78, 34:77, NB NS [1138], PEI 39:98; confined to NS and s. NB to the limits of the beech scale, F55:11, F57:25.
- Nectria episphaeria* (Tode ex Fr.) Fr.: on 1 Ont F62:70.
- N. galligena* Bres.: canker, chancre nectrien: on 1 in n. NB beyond the limits of the beech scale, F57:25.
- Nematogonum ferrugineum* (Pers.) Hughes (*N. aurantiacum* Desm., *Gonatorrhodiella highlei* A.L.Sm.): brown mold, moisissure brune: common on cankers caused by *Nectria coccinea* (q.v.) on 1 NB NS [273], NB F53:24; cf. 42:93.
- Odontia crustosa* (Pers.) Quél.: on 1 NS [1138]; see *Abies*.

Odontia papillosa (Fr.) Bres. [*Hyphodontia p.* (Fr.) John Erikss.]: on decayed *I* NS [1138].

Omphalia epichysium (Fr.) Quél.: on old logs of *I* NS [1138].

Orbilbia inflatula Karst.: on *I* NS [1138].

Panus laevis Berk. & Curt.: on *I* NS [1138].

P. stipticus (Bull. ex Fr.) Fr.: on *I* NS 30:78, [1138].

P. torulosus Fr.: on *I* NS [1138].

Paxillus involutus Fr.: on logs of *I* NS [1138].

Pellicularia pruinata (Bres.) Rogers: on logs of *I* NS [1138]; see *Acer*.

Peniophora affinis Burt (*P. laevis* sensu Burt): on *I* NS [1138].

P. aspera (Pers.) Sacc. (*P. setigera* (Fr.) Höhn. & Litsch.): on dead wood of *I* NS [1138].

P. carnosa Burt: on *I* NS [1138].

P. cinerea (Fr.) Cke.: on *I* NS [1138]; from sporophores on *I* Que [793].

P. crenea (Bres.) Sacc. & Syd.: on *I* NS [1138].

P. heterocystidia Burt: on *I* Ont Que [705]; see *Acer*.

P. hydroides Cke. & Masee: on *I* NS [1138].

P. sanguinea (Fr.) Höhn. & Litsch.: on log of *I* NS [1138].

P. velutina (Fr.) Cke.: on *I* NS [1138].

Phlebia radiata Fr. (*P. merismoides* Fr.): on *I* NS [1138].

Pholiota acericola Pk.: on decaying trunks of *I* NS [1138].

P. aurivella (Batsch ex Fr.) Kummer (*P. adiposa* auct. Am.): on dead wood of *I* NS [1138].

P. squarrosoides Pk.: on stump and logs of *I* NS [1138].

Phyllotopsis nidulans (Pers. ex Fr.) Singer (*Claudopus n.* Pers. ex Fr.): on logs of *I* NS [1138].

Physarum contextum Pers.: on bark of *I* NS [1138].

Pilacre faginea (Fr.) Berk. & Br.: on *I* NB NS [1138].

Pleurotus lignatilis (Pers. ex Fr.) Gill.: reported on *I* NB NS [1138].

P. ostreatus (Jacq. ex Fr.) Kummer: on *I* NS [1138].

P. serotinus (Schr. ex Fr.) Kummer: on *I* NB NS [1138].

Polyporus abietinus Dicks. ex Fr.: on *I* Ont F55:62, either the fungus or the host were misdetermined?

P. adustus Willd. ex Fr.: white mottled rot, carie blanche madrée: from *I* Que [791].

P. albellus Pk.: from *I* Que [791]; on *I* NS [1138].

P. brumalis Pers. ex Fr. and *P. caesius* Schrad. ex Fr.: on *I* NS [1138].

P. cuticularis Bull. ex Fr.: on *I* Ont [791].

P. elegans Bull. ex Fr.: on *I* NS F53:26.

P. fagicola Murr.: on *I* NS [1138].

P. glomeratus Pk.: white spongy rot, carie blanche spongieuse: on logs of *I* NS [1138].

P. hirsutus Wulf. ex Fr.: white spongy rot, carie blanche spongieuse: from sporophores of *I* Que [795]; on *I* NS [1138].

P. nidulans Fr. and *P. paragamenus* Fr.: on *I* NS [1138].

P. pubescens Schum. ex Fr.: from sporophores on *I* Que [795]; on dead wood of *I* NB [1058].

P. resinosus Schrad. ex Fr.: from sporophores on *I* Que [795].

P. semisupinus Berk. & Curt.: on *I* NS [1138].

P. tulipiferae (Schw.) Overh. (*Irpex t.* Schw.): on *I* NB F53:26, NS [1138].

P. varius Fr. and *P. velutinus* Fr.: on *I* NS [1138].

P. versicolor L. ex Fr.: white spongy rot, carie blanche

spongieuse: on *I* NS [1138]; on dead wood of *I* NB [1058].

Poria eupora (Karst.) Cke. and *P. ferruginosa* (Schr. ex Fr.) Karst.: on *I* NS [1138].

P. subacida (Pk.) Sacc.: from decay of *I* NB NS F53:22.

Porothelium fimbriatum Pers. ex Fr.: on *I* NS [1138].

Propolis faginea (Schr. ex Fr.) Karst.: on wood of *I* NS [1138].

Prosthemium formosa Sacc. & Malbr.: on old sphaeria-ceous stromata on *I* NS [1138].

Psathyrella hydrophila (Fr.) A.H.Smith (*Hypholoma hydrophilum* Fr.): at base of stump of *I* NS [1138].

Pycnoporus cinnabarinus (Jacq. ex Fr.) Karst. (*Poly-porus c.* Jacq. ex Fr.): on *I* NB F53:25, NB NS [1138].

Quaternaria quaternata (Pers.) Schroet.: on *I* Ont F63:71.

Rosellinia globata (Fckl.) Sacc. var. *microtricha* (Felt.) Höhn.: on *I* NS [1138].

Schizophyllum commune Fr.: on old logs of *I* NS [1138].

Solenia anomala (Pers.) Fckl.: on *I* NS [1138].

Sphaerobolus stellatus Tode: on decayed wood of *I* NS [1138].

Steccherinum ochraceum (Fr.) S.F.Gray: on *I* NS [1138].

Stemonitis fusca Roth: on *I* NS [1138].

Stereum hirsutum (Willd. ex Fr.) S.F.Gray: on *I* NS [1138].

S. ostrea Blume & Nees ex Fr. (*S. fasciatum* (Schw.) Fr.): white crumbly rot, carie blanche friable: on *I* NS F53:26, [cf. 1138].

S. purpureum (Pers. ex Fr.) Fr.: silver leaf, plomb: on *I* NB F53:26, but see *S. roseocarneum*.

S. roseocarneum (Schw.) Fr.: on limbs of *I* NS [1138]; see *Acer*.

Strickeria vilis (Fr.) Wint.: on *I* NS [1138].

Tomentella subfusca (Karst.) Höhn. & Litsch.: on *I* NS [1138].

Trematosphaeria faginae Morg.: on bark of *I* NS [1138].

Tremella lutescens Pers.: on *I* NS [1138].

Trichia inconspicua Rost.: on bark of *I* NS [1138].

Trichocladium canadense Hughes: from rotted trunk and butts of *I* Ont [483].

Trogia crispa Fr.: on *I* NS [1138].

Xylaria corniformis Fr.: on *I* Que 34:101.

X. polymorpha (Pers.) Grev.: on dead wood, etc., of *I* NS [1138].

Zignoella pulviscula (Curr.) Sacc.: on decorticated wood of *I* NS [1138].

Festuca L.

GRAMINEAE

Perennial grasses of cool to temperate regions of all continents; several furnish good grazing and others are cult. for hay, pasture or turf.

1. *F. altaica* Trin.; in Alaska, Mack and BC; also e. Asia.
2. *F. arundinacea* Schreb. (*F. elatior* L. var. *arundinacea* (Schreb.) Wimm.); cult. and sparingly escaped in NS, Ont. Man and Alaska; naturalized from Europe.

Festuca

3. *F. brachyphylla* Schultes (*F. ovina* L. var. *brachyphylla* (Schult.) Piper, *F. o.* var. *brevifolia* (R.Br.) Wats.); Greenl to Alaska and Canada, south to Labr, Nfld, Que and BC; also in Europe.
4. *F. elatior* L. (*F. pratensis* Huds.), meadow fescue, grande queue de rat; Nfld to BC, cult.: naturalized from Europe.
5. *F. gigantea* (L) Vill.; rare, adventive from Europe in US.
6. *F. idahoensis* Elmer; BC to Sask and into the US.
7. *F. myuros* L.; introduced from Europe; naturalized in w. BC.
8. *F. ovina* L., sheep fescue, poil de loup; naturalized from Europe in NS to BC. 8a, *F. o.* var. *duriuscula* (L.) Koch (*F. d.* L.); reported from Alaska, BC and Nfld, naturalized from Europe. 8b, *F. o.* var. *saximontana* (Rydb.) Gl. (*F. s.* Rydb.); in Nfld and from Que to BC, in Mack and Alaska.
9. *F. rubra* L., including 9a, *F. r.* var. *arenaria* (Osbeck) Fries, 9b, *F. r.* var. *commutata* Gaud., 9c, *F. r.* var. *lanuginosa* Mert. & Koch, and 9d, *F. r.* var. *prolifera* Piper; in the arctic or subarctic from Alaska across Canada to Greenl and further south.
10. *F. scabrella* Torr., including 10a, *F. s.* var. *major* Vasey, bunch grass; in Nfld, from Que to Man and in BC.
11. *F. subulata* Trin.; Alaska, Alta and BC to Utah and Calif.

Anguina sp.: gall nematode, gall nématique des graines: on seed of 9 imported from Oregon [535].

Ascochyta sorghi Sacc. (*A. graminicola* Sacc.): leaf spot, tache ascochytiq: on 9 cult. Man 43:39.

Bipolaris sorokiniana (Sacc. in Sorok.) Shoem. (*Helminthosporium sativum* Pamm., King & Bakke) and *Fusarium* spp.: root rot, piétin: on 9 cult, Alta 49:37, 54:53, 55:51.

Cladosporium graminum Cda.: on 8 Greenl [601].

Claviceps purpurea (Fr.) Tul.: ergot, ergot: on 4 BC [50], Alta 61:58, Man [93, p. 45], Que 47:38; on 9 BC Alta [172], Alaska [175, 1037], Alta Ont [1034], Ont 45:52, NB 60:83; 2, 9b and 10a artificially infected with conidia of the rye ergot [172].

Colletotrichum graminicola (Ces.) G.W.Wilson: on 9 BC [1034].

Corynebacterium agropyri (O'Gara) Murray et al. (*Phytomonas a.* (O'Gara) Bergey et al.): bacterial leaf spot, tache bactérienne: on 9 cult. Alta 44:36, 46:30, 47:38, 48:34.

Dilophospora alopecuri (Fr.) Fr.: twist, torsion: on 4 NB 60:83.

Diplodina arctica Lind: on 8 Keew [604].

Drechslera dictyoides (Drechs.) Shoem. f. sp. *dictyoides* (*Helminthosporium d.* Drechs.): net blotch, tache reticulée: on *F.* spp. NB 60:83; on *F. s.* Alta, 2 Ont, 4 Alta Man Ont [993]; on 4 BC [535], Alta Man 57:24, Man 56:16, Ont 45:42.

Fungi from seed: *Acremoniella atra* (Cda.) Sacc., 9 Ont; *Alternaria tenuis* auct. sensu Wiltshire, 4 Man, 9 Ont; *Aureobasidium pullulans* (de Bary) Arn., 4 Man, 9 Ont; *Bipolaris sorokiniana* (Sacc. in Sorok.) Shoem., 4 Man [374]. *Chaetomium globosum* Kze., 4 Ont [374], 9 Alta [1009]. *Cladosporium cladosporioides* (Fres.) De Vries, *C. herbarum* Lk., 4 Man; *Curvularia inaequalis* (Shear) Boed., 4 Ont; *Drechslera dictyoides* (Drechs.) Shoem., 4 Man Ont; *Epicoccum neglectum* Desm., 9 Ont; *E. nigrum* Lk., 4 Ont [374]. *Fusarium acuminatum* Ell. & Ev., 9 Ont; *F. equiseti* (Cda.) Sacc., 4, 9 Ont [334]. *Gelasinospora tetrasperma* Dowding, 9 Que [156, 374]. *Nigrospora oryzae* (Berk. & Br.) Petch, 4 Man; *Papularia arundinis* (Cda.) Fr., 9 Ont; *Rosellinia limoniiformis* Ell. & Ev., 9 Alta; *Selenophoma donacis* (Pass.) Sprague & Johnson, 4 Man; *Sordaria fimicola* (Rob.) Ces. & de Not., 9 Ont; *Stemphylium botryosum* Wallr., 4, 9 Ont; *Trichoderma viride* Pers., 4 Ont [374].

Fusarium acuminatum Ell. & Ev.: on 3 Alaska [1037].

F. avenaceum (Fr.) Sacc.: on 9 Alaska [1037].

F. nivale (Fr.) Ces.: on 3 Alaska [1037]; 9 Alaska [1042].

F. poae (Pk.) Wr.: associated with silver tip of 9 BC 61:58, [cf. 335].

Guignardia graminis (Lind) Barr (*Ascospora* g. Lind): on 3 Greenl [602].

Hendersonia arundinacea (Desm.) Sacc.: on 8 Frank [604].

H. crastophila Sacc.: on 9 Man 43:39.

H. culmicola Sacc.: on 3 Alaska [1037]; on 9 NB 60:83.

Heteropatella umbilicata (Pers. ex Fr.) Jaap (*Septoria cercosperma* Rostr.): on 8a Greenl [900].

Heterosporium phlei Gregory: on 1, 9c Alaska [175, 1037].

Lophodermium arundinaceum (Schrad. ex Fr.) Chev.: on 3 Alaska [1036], Greenl [601, 602, 603]; on 8 Frank [604, 903], Greenl [601, 604, 899, 901]; on 9 Greenl [899]; on 9a Mack [250].

L. arundinaceum var. *alpinum* Rehm: on 3 Keew [959].

Low-temperature basidiomycete, basidiomycète frigophile: winter crown rot, piétin hivernal: causes severe damage to 9 in Alta 46:30, but less prevalent on 4 [215, 217]. Under controlled conditions 90 percent of the plants of 9 were infected and damage was severe [218].

Microthyrium culmigenum Syd.: on 3 Alaska [1038].

Mollisia graminis (Desm.) Karst.: on 8 Greenl [901].

Mycosphaerella pusilla (Auersw.) Johans. (*Sphaerella p.* Auersw.): on 8 Greenl [899].

M. recutita (Fr.) Johans.: on 9a Yukon [600].

M. tassiana (de Not.) Johans. (*Sphaerella t.* de Not.): on *F.* spp. BC [50]; on 3 Greenl [601, 602, 603]; on 8 Frank [604], Greenl [601, 899, 901].

M. tassiana var. *tassiana*: on 3 Frank [52].

M. tulasnei (Jancz.) Lindau: on 9 Alaska [1038].

M. wichuriana (Schroet.) Johans.: on 3 Frank [600]; on 6 BC [50]; on 8 Greenl [601].

Ophiobolus graminis Sacc.: on 3 Alaska [1037].

Passalora graminis (Fckl.) Höhn. (*Scolecotrichum g.* Fckl.): brown stripe, strie brune: on 9 Alta 52:41, Ont 45:42, NB 60:82.

Pellicularia filamentosa (Pat.) Rogers (stat. steril. *Rhizoctonia solani* Kühn): on 9 Alta [1034].

Phaeoseptoria festucae Sprague: on 1 Alaska [1037]; on 9 NB 60:83.

Phleospora idahoensis Sprague (*Phoma* sp.): on 4, 9 Alaska [1034, 1037].

Phyllachora silvatica Sacc. & Speg. (*P. graminis* (Pers.) Fckl. sensu lat.): tar spot, rayure goudronneuse: on 9 BC 41:25, [50, 1034].

Platyspora pentamera (Karst.) Wehm. (*Clathrospora p.* (Karst.) Berl., *Pleospora p.* Karst.): on 3 Yukon [600], Greenl [602]; on 8 Frank [604], Greenl [603, 899, 902].

Plenodomus meliloti Dearn. & Sanford: from 9 Alaska [592].

Pleospora heleocharidis Karst. var. *arctica* (Karst.) Wehm. (*P. a.* Karst.): on 3 Frank [52].

P. herbarum (Fr.) Rabh. var. *h.* (*P. discors* (Dur. & Mont.) Ces & de Not.): on 3 Greenl [603].

Puccinia coronata Cda.: crown rust, rouille couronnée: II III on 4 Ont 45:42; rather severe on cultivars of 2, 4 Ont 47:38, [cf. 15, p. 152].

P. coronata f. sp. *festucae* Erikss.: isolated several times from aecia of *Rhamnus cathartica* collected in E. Canada, 48:15 et seq., [cf. 845].

P. crandallii Pamm. & Hume: leaf rust, rouille des feuilles: II III on 3 Alaska [1037]; on 8 Sask [93, p. 67]; on 8b Sask [15, p. 162]; on 9c Alaska [175].

P. festucae Plowr.: II III on 1 Alaska [175, 1037; cf. 15, p. 155].

P. graminis Pers.: stem rust, rouille de la tige: II III on F. sp. BC 30:36, Ont 48:34; on 4, 7 cult. Man [93, p. 68]; on 4 Ont [828]; on 9 Man 43:39, [cf. 15, p. 173].

P. poae-nemoralis Otth (*P. poae-sudeticae* Jørstad): II III reported on 4 BC 40:27, [535], but identity uncertain.

P. recondita Rob. ex Desm. (*P. cockerelliana* Bethel ex Arth.): II III on 9c Alaska [1037]; on 10 Alta [15, p. 163].

Pyrenopeziza karstenii Sacc.: on 3 Alaska [1038].

Pythium debaryanum Hesse: on 3 Alaska [1037].

P. graminicola Subram. (*P. arrhenomanes* Drechsl.): on 4 Sask 37:6, [1034].

Ramularia pusilla Unger (*Ovularia p.* (Ung.) Sacc. & D.Sacc., *O. pulchella* (Ces.) Sacc.): leaf spot, tache des feuilles: on 3 Yukon [1042]; on 4 NB 60:83; on 9 Alaska [1038], Que [1041]; on 9, 9c Alaska [175, 1037].

Sclerotinia borealis Bubák & Vleugel: snow mold, moisissure nivéale: on 4, 5, 9 cult. BC [377].

Selenophoma donacis (Pass.) Sprague & Johnson var. *stomaticola* (Bäuml.) Sprague and Johnson: on 3 Yukon [1042].

S. everhartii (Sacc. & Syd.) Sprague & Johnson: on 3, 9 Alaska [1042].

Septoria nodorum Berk.: on 11 Alaska [1042].

S. tenella Cke. & Ell.: on 3, 9, 9d Alaska [1037]; on 4, 9 Alaska [1042]; on 9d Alaska [1038].

Spermospora subulata (Sprague) Sprague: on 3, 9 Alaska [1037]; on 9 Alaska [1038], NB 60:83.

Typhula spp.: under controlled conditions Alta isolates of *T. ishikariensis* Imai (*T. idahoensis* Remsb.) caused 100 percent infection and severe damage on 9; *T. incarnata* Lasch ex Fr. (*T. itoana* Imai) 70 percent infection, moderate damage; and *T. trifolii* Rostr. 10 percent infection, slight damage [218].

Vermicularia sp.: on 9 Alaska [1037, 1038].

Barley yellow dwarf virus: yellow dwarf, nanisme jaune: from 4 Ottawa, Ont [1030].

Ficus L.

MORACEAE

Trees, erect shrubs or climbers, native to tropical or subtropical countries; one grown for its fruit, others for shade and ornament.

1. *F. carica* L., common fig, figuier; native to the Mediterranean region.
2. *F. elastica* Roxb., the rubber plant, caoutchouc, of greenhouses, hotel rotundas, etc.; native to India and Malaya, where it becomes a forest tree.

Botrytis cinerea Pers.: cause of a twig blight and dieback of 1 BC [535]; of watersoaked lesions on imported 2 Que 53:117.

Colletotrichum gloeosporioides Penz. (*Gloeosporium cingulatum* Atk.): anthracnose, anthracnose: on F. sp. Que 59:88.

Gloeosporium sp.: on 2 Man [93, p. 130].

Nectria cinnabarina Tode ex Fr. (*Creonectria purpurea* (L.) Seav.): on F. sp. BC [50].

Filipendula Adans.

ROSACEAE

Tall hardy herbs native to north temperate regions; cult. for their showy flowers.

1. *F. rubra* (Hill) Robins., queen of the prairie, reine des prés; native to the US; cult. and escaped in NS.
2. *F. ulmaria* (L.) Maxim., queen of the meadow, belle des prés; introduced from Europe; escaped from cult. in Nfld, NS and e. Que.

Phyllosticta ulmariae Thüm.: leaf spot, tache foliaire: on 2 Man 45:112.

Sphaerotheca macularis (Wallr. ex Fr.) Magn. (*S. humuli* (DC.) Burr.): powdery mildew, blanc: on 1, 2 Ont 41:91; on 1 Que 44:108.

Forsythia Vahl

OLEACEAE

Deciduous shrubs of e. Asia and one of s.e. Europe; cult. for their showy yellow flowers in early spring.

1. × *F. intermedia* Zab.
2. *F. suspensa* (Thumb.) Vahl; native to China.

Botrytis cinerea Pers.: gray mold, moisissure grise: cause of blossom and twig blight of F. sp. NS 58:104.

Phoma sp.: associated with aerial root galls of ? BC 55:116.

Pseudomonas syringae van Hall: bacterial blight, brûlure bactérienne: severe on F. sp. NS 61:113.

Fragaria L.

ROSACEAE

Low perennial herbs mainly of temperate regions in N. and S. America and Eurasia.

1. *F. chiloensis* (L.) Duchesne; Alaska to Calif and Chile. 1a, *F. c.* var. *ananassa* Bailey (×

Fragaria

F. ananassa Duchesne), cultivated strawberry, fraiser.

2. *F. vesca* L.; native to Nfld and e. Que; elsewhere mainly introduced from Europe; source of the alpine strawberries cult. in Europe and sometimes in N. America. 2a, *F. v.* var. *americana* Porter; in NS and from Que to n. Alta.
3. *F. virginiana* Duchesne (including *F. canadensis* Michx.), wild strawberry, fraiser des champs, the common wild strawberry of e. N. America; Nfld and NS to Alta. 3a, *F. v.* var. *glauca* Wats. (*F. g.* (Wats.) Rydb., *F. pauciflora* Rydb.). 3b, *F. v.* var. *platypetala* (Rydb.) Hall (*F. p.* Rydb.).

Armillaria mellea (Vahl ex Fr.) Kummer: associated with crown and root rot, pourridié-agaric, of 1a BC 38:90, particularly on newly cleared land, 52:98, 53:102.

Botrytis cinerea Pers.: gray mold, moisissure grise: a common cause of rot of fruits of 1a in the field and on the market, especially in the Maritime Provinces and coastal BC, but also during prolonged wet weather anywhere: on *F. sp.* Alaska [175]; on 1a BC 30:76, Alta 53:102, Sask 28:52, Man [93, p. 113], Man NB NS 23:70, Ont 24:32, Que PEI 25:29, NS PEI [1138]; on imported berries, 40:84. In seasons favorable for the disease, captan reduced infection Ont 56:115. Thiram and captan were recommended for control of calyx and fruit rot of 1a, NS. For maximum control floral parts must be protected from the beginning of bloom [340].

Ceratobasidium anceps (Bres. & Syd.) Jackson: on 2a Ont [495].

Chaetomium globosum Kze.: from 3 Que [1009].

Dendrophoma obscurans (Ell. & Ev.) H.W. Anderson: leaf blight, brûlure des feuilles: first recognized as distinct from other leaf spots on 1a in Ont 48:93, but since reported in Que 55:113 and NS 52:98; noted particularly on Senator Dunlop and Premier, 49:91, but more recently on Cavalier and Redcoat, 61:100; also on 2, 3 Ont 49:91, NS 53:102. For contrasting symptoms with other leaf-spotting organisms, of temperature and humidity requirements for germination and infection, see [283].

Diachea leucopodia (Bull.) Rost.: on 1a BC 61:100.

Diplocarpon earliana (Ell. & Ev.) Wolf (*Mollisia e.* Ell. & Ev.; stat. conid. *Ascochyta colorata* Pk., *Marssonia fragariae* (Lib.) Kleb., *M. potentillae* (Desm.) Magn. s. lat.): leaf scorch, tache pourpre: on *F. sp.* Alaska [175]; on 1a BC 34:70, Sask 38:39, Man 44:96, Ont 21:37, Que 36:65, NB 23:69, NS 56:115, [1138], PEI 25:39, Nfld 49:xx; on *F. sp.* Man, 3a Sask Man [93, p. 131]; on 1 Alaska [1038]; on 3 Que 32:102. General and sometimes severe on British Sovereign in BC 37:64; cultivar resistance reported in Ont 49:91; usually only severe late in the season Ont 52:98. Suitable infection scales for roguing strawberry seedlings affected by this fungus or *Mycosphaerella fragariae* (q.v.) were developed [1033]; for symptoms see [283].

Fuligo septica (L.) G.F. Weber: on *F. sp.* Alaska [175], Man 53:102.

Fusarium spp. from diseased roots: *F. acuminatum* Ell. & Ev., *Cylindrocarpon radicola* Wr., Man; *F. avenaceum* (Fr.) Sacc., *F. oxysporum* Schlecht., *F. poae* (Pk.) Wr., *F. sambucinum* Fckl. var. *coeruleum* Wr., NS [335].

Gnomonia fruticicola (Arn.) Fall (*G. fragariae* Kleb. var. *fruticicola* Arn.; stat. conid. *Zythia fragariae* Laibach): leaf blotch or petiole blight, brûlure du pétiole: on 1a BC 58:101, Ont 49:91, Que 54:119, NS 52:98; on leaves, petioles, calyx and pedicels, 54:119, 57:113; for symptoms see [96, 283].

Marssonina canadensis Bolton: on 3 BC [100, p. 240].

Meloidogyne sp. (*Heterodera marioni* (Cornu) Goodey): root-knot nematode, nodosité des racines: on 1a BC 48:93, on newly imported virus-free plants NS 55:113.

M. hapla Chitwood: on 1a NS 55:114.

Mycosphaerella fragariae (Tul.) Lindau (stat. conid. *Ramularia tulasnei* Sacc.): leaf spot, tache commune: on *F. sp.*, 1 Alaska [115]; on *F. sp.* Sask Man, 3a Sask [93, p. 125]; on 1a BC to PEI 24:31, NS [1138], Nfld 49:xx, 57:113; on 2 cult. NS 52:99; on 3 Ont Nfld, 3a Yukon 49:92; on 3a BC [535], Man 34:101. Frequent, and in cool wet seasons, premature defoliation causes reduction of yields NS 52:99; cultivar resistance apparently occurs, 49:92. Spraying to control foliage and fruit diseases noticeably improved yields and vigor of plants [97]; infection reduced by spraying with bordeaux NS 32:79, by spraying with captan NS 54:119, or by burning off the plants in spring PEI 61:100; thiram was the best fungicide for control of leaf spot NS [340]; for symptoms see [283]. Isolates differ in culture characteristics [98] and in pathogenicity [99].

Paratylenchus spp.: pin nematodes: obtained from soil of 1a fields in BC 58:101.

Pezizella oenotherae (Cke. & Ell.) Sacc.: tan rot, pourriture bistre: on leaves of 1a Que 57:114.

Phyllosticta fragaricola Desm. & Rob. (?stat. imperf. of *Mycosphaerella fragariae*, q.v.): on 1a Man 44:96.

Phytophthora fragariae Hickman: red stele, stèle rouge: on 1a BC 45:99, Alta 59:80, Ont 54:100, NB 49:92, NS 48:94. A destructive disease in coastal BC, but use of certified plants reduced losses and improved drainage has brought some relief, 51:102.

Pratylenchus penetrans (Cobb) Filipjev & Stekh.: root-lesion nematode, nématose des racines: on 1a BC 58:101, Ont 56:116, NS [1134]. Since the extent of lesioning of 2 in experimental trials varied with the level of the nematode population it was concluded that *P. penetrans* is an important parasite in the strawberry root-rot complex [1088]. Perennial, mostly weedy, plants in strawberry plantings in root-rot patches found to harbor large populations of the nematode [1089]; other nematodes have been observed in plants affected by root decline in BC 53:103..

Pythium sp.: associated with root rot Ont 35:59.

Rhizoctonia solani Kühn: associated with crown rot, rhizoctone commune, of 1a BC 30:77, 56:102, Que 51:102; and as a fruit rot of imported berries, 40:84.

Septoria aciculosa Ell. & Ev.: reported from plants of 1a NS 57:114, 59:80.

Sphaerella earliana Wint.: on 1 BC [50].

Sphaerotheca macularis (Wallr. ex Fr.) Magn. (*S. humuli* DC.) Burr.): powdery mildew, blanc: on 1a BC Que 38:89, Sask Man [93, p. 44], Sask Ont NB NS PEI 24:32, NS [1138]; on 1, 3b Alaska [175]. A very common disease, but efforts to control the pathogen are limited BC 57:114, Ont 21:37, NS 48:102.

Verticillium spp.: wilt flétrissure verticillienne: on 1a BC 54:120, Ont 51:103, NS 52:99. While *V. spp.* may be involved in black root (q.v.) the Ont outbreak of wilt in 1951 was the first so recorded;

V. spp. were also considered to be the cause of serious wilt in commercial fields of *Ia* in BC [711; cf. 783].

Xiphinema americanum Cobb: on *Ia* BC 58:xx; in unthrifty plants NS [1134].

Black root or root rot, racines noires ou pourriture des racines: on *Ia* BC 32:80, Alta 33:60, Sask 48:95, Man 34:71, Ont Que NB PEI 24:32, NS 52:100; very common and often destructive. Originally attributed to late frost Ont 21:37, or dry spring weather, but examination of plants in a moist spring revealed disease was widespread although aboveground symptoms were nearly absent Ont 37:64.

In Ont numerous fungi were associated on or in the diseased roots and under experimental conditions many were pathogenic [440, 1092], but later nematodes [447], more especially *Pratylenchus penetrans* (q.v.), were considered to play an important role [454]. Soybeans grown and turned under as green manure in strawberry root-rot soil markedly altered the bacterial flora of the soil and were the most effective of the plants tested in reducing root-rot in strawberry, 41:80, [454]; this effect was explained by the carbohydrate breakdown of soybeans in contrast to the putrefactive breakdown of red clover [446]. A survey in NS for plant-parasitic nematodes suggests root rot may occur where these nematodes are absent [1134].

Virus diseases: present knowledge of strawberry viruses has been summarized by Miss Mellor and Fitzpatrick [725]. They recognize nine distinct viruses. The aphid-transmitted mottle virus Thomas and mild yellow-edge virus Prentice are world wide and in combination cause xanthosis or yellows, jaunisse, probably responsible for most of the degeneration in Canada. Crinkle virus Zeller & Vaughan, although symptomless in British Sovereign and Marshall, 51:103, 52:99, when combined with the other two viruses causes even more severe symptoms on the Pacific coast of the US; it is unknown in BC. Vein-banding virus Frazier (with latent-A virus) causes marked chlorosis or purpling in commercial varieties on both coasts of N. America; it is aphid transmitted. Records are: mosaic, mosaïque: Ont NS 29:59, BC 35:59, NB 36:66, PEI 40:85; yellows, jaunisse: NS 36:66, Que 40:85, BC NB 48:94; crinkle, gaufrure: NB 40:85, NS 53:103, Sask 58:94.

Two latent viruses, transmitted only by grafting, are known: latent-A virus Frazier & Prentice, occurring naturally in England and Calif, but probably present more widely; and latent-C virus McGrew, in e. N. America.

Witches'-broom virus Zeller, possibly aphid transmitted, is known only in N. America: NS 40:85, Alta 45:100, BC NB 47:98; on *3a* Mack 51:103.

Two leafhopper-transmitted viruses are recorded: aster yellows virus Kunkel, in Calif and Ark but unrecognized in Canada on *Ia*; and green petal virus Posnette: NS 55:114, NB 56:117, BC (unconfirmed) Que 57:115, [579], Ont 59:81; probably related to phyllody of *Trifolium* (q.v.) known in E. Canada.

Virus-free plants remained healthy and cropped well only when the plantings were isolated from old diseased ones, BC 53:103.

Virus, tobacco necrosis virus: on *Ia* BC 58:103.

June yellows, jaune de juin: genetic breakdown, défaut génétique: recorded on *Ia* Ont 34:71, NB 45:100, NS 42:91, PEI 41:80, Que 52:99. Premier seemed to be frequently affected, but the symptoms may have been confused with those of yellows, cf. Ont 56:117.

Chemical injury: from herbicide Ont 55:114; from fungicide BC 58:103.

Element deficiencies: of iron, a chlorosis, chlorose, induced by lime Alta 35:59, of magnesium NB 57:115; and of potassium, causing a scorch, pyrolyse, PEI 38:90.

Low-temperature or winter injury: BC 36:66, greatly reduced by mulching before freeze-up in Ont 39:96, Que PEI 50:112, NB 44:97; frequent occurrence in BC 57:115.

Frost injury at bloom: Ont NB 36:66, BC PEI 39:96, Ont 56:117.

Fraxinus L.

OLEACEAE

Deciduous trees or rarely shrubs, mainly of the northern hemisphere but also in Asia south to Java.

1. *F. americana* L., white ash, frêne blanc; in Canada from NS and NB to Que and Ont. Wood is valued mainly for its toughness and resilience; planted occasionally for shade.
2. *F. excelsior* L., European ash, frêne d'Europe; occasionally for shade.
3. *F. nigra* Marsh., black ash, frêne noire; in Canada from NS to NB to e. Man. Wood is used mainly for interior finish and cabinetwork on account of its attractive appearance.
4. *F. pennsylvanica* Marsh., red ash, frêne rouge; in s.w. Que and s. Ont. Rarely distinguished from 4a, *F. p.* var. *austini* Fern., northern red ash, frêne rouge du nord; in Canada from NS to s. Man. More common is 4b, *F. p.* var. *subintegerimma* (Vahl) Fern. (*F. p.* var. *lanceolata* (Borkh.) Sarg., *F. lanceolata* Borkh., *F. campestris* Britt., *F. viridis* Michx.f.), green ash, frêne vert; in Canada from Que to Sask and possibly Alta; wood weaker and less useful than that of 1.

Botryosphaeria fuliginosa (Moug. & Nestl.) Ell. & Ev.: on dead branches of 4 Man [93, p. 59]; the fungus is probably *B. quercuum* (Schw.) Sacc.

Calicium pusillum (Achar.) Floerke: on stump of 4 Man [93, p. 38].

Camarosporium ?orni P.Henn.: on dead water sprouts of 4 Man [93, p. 132].

Cenangium populneum (Pers.) Rehm: rare on 4 Sask Man [93, p. 39]; an *Encoelia* but not *E. fascicularis*, fide Groves.

Chaetomella atra Fekl. var. *lignicola* Sacc.: on decorticated wood of ?*F.* sp. Man [93, p. 132].

Chlorosplenium aeruginascens (Nyl.) Karst.: on 4 Man [93, p. 39].

Colletotrichum dematium (Fr.) Grove var. *samaricola* Sacc.: on samarae of 4 Man [93, p. 129].

Corticium argentatum Burt: on branches of 4 Man [93, p. 75].

C. contiguum Karst. (*C. crustaceum* (Karst.) Höhn. & Litsch.): on 4 Man [93].

Curreyella bisbyi Dearn.: on branches of 4 Man [93, p. 46].

Fraxinus

- Cytospora chrysosperma* (Pers.) Fr.: associated with canker and dieback of branches of *F. sp.* Sask F52:97.
- C. pruinosa* Sacc.: on trunk and branches of *F. sp.* Sask F52:97.
- Dendrophoma pruinosa* (Fr.) Sacc.: on *F. sp.* NB F59:34.
- Dermatella fraxini* Ell. & Ev.: on bark of *F. sp.* London, Ont; this fungus is a *Pezicula*, fide Groves [370, p. 402].
- Dermea tulasnei* Groves: on *F. spp.* Ont Que [370, p. 401].
- Dictydiaethalium plumbeum* (Schum.) Rost.: on *F. sp.* Man [93, p. 25].
- Dinemasprium robiniae* Gerard: on old branches of 4 Man [93, p. 133].
- Discosia artocreas* Tode ex Fr.: on samarae of 4 Man [93].
- Durandiella fraxini* (Schw.) Seav. (*Godronia f.* (Schw.) Seav.; stat. conid. *Sphaerographium fraxini*, q.v.): on *F. spp.* Ont Que NS [373]; on 1 Ont [977, 979], [cf. 1138].
- Eutypella ?vitis* (Schw.) Ell. & Ev.: on branches of 4 Man [93, p. 57].
- Fomes conchatus* (Pers. ex Fr.) Gill.: white spongy rot, carie blanche spongieuse: on *F. spp.* Ont Que NB [668]; on *F. sp.*, 3 NB [1138].
- F. fraxineus* (Bull. ex Fr.) Cke.: on *F. spp.* Ont Que [668].
- F. fraxinophilus* (Pk.) Cke.: on *F. spp.* Ont Que [668]; from 1 Que [791]. Causes a white mottled rot of broad-leaved trees, usually *F. spp.*; for culture characteristics, see Nobles [791]; also [795].
- F. igniarius* (L. ex Fr.) Kickx: white trunk rot, carie blanche du tronc: on 1, 3 Ont F55:59; on 3 NB F54:24; on 4 Man 24:79.
- Fusarium lateritium* Nees: from twigs of 4 Man [93, p. 118]; on 4b Man [335].
- Gloeosporium aridum* Ell. & Holw. (*G. irregulare* Pk. [*Discula quercina* (West.) Arx]): anthracnose, antracnose: on *F. sp.* Ont 25:61, 46:77, Que F58:36; on 1 NB F54:25, NS 51:105, [1138, p. 107]; on 4b Alta 53:106.
- Hendersonia fraxini* Ell. & Barth.: on small dead branches of *F. sp.* Alta 40:86.
- Hypoxylon vogesiacum* Pers. ex Sacc.: on *F. sp.* Ont F63:70.
- Hysterographium fraxini* (Pers. ex Fr.) de Not.: on 1 Ont F60:66; abundant on dead branches of 4 Man [93, p. 43].
- Lophiostoma triseptatum* Pk.: on branches of 4 Man [93, p. 53].
- Mollisia cinerea* (Batsch) Karst.: on old wood of *F. sp.* Man [93, p. 40].
- Mycosphaerella effigurata* (Schw.) House (recorded under stat. conid. *Cylindrosporium fraxini* (Ell. & Kell.) Ell. & Ev., *Marssonina fraxini* Ell. & Davis, *Septoria besseyi* Pk. or stat. sperm. *Piggotia fraxini* Berk. & Curt.): leaf spot, tache des feuilles: on *F. spp.* Sask 32:82, 35:60, NS F58:26; on 1 Que 31:121, NS 52:104; on 3 NB F54:25; on 4 Man [93, p. 137]; on 4b Sask 52:104, [93, p. 136], Man 42:93.
- M. fraxinicola* (Schw.) House (recorded under stat. imperf. *Phyllosticta viridis* Ell. & Kell.): leaf spot, tache des feuilles: on *F. sp.* Sask 32:82; on 4 Man, 4b Sask [93, p. 136]; on 4b Man 44:100.
- Ostropa cinerea* (Pers.) Fr.: on fallen branches of 4 Man [93, p. 42].
- Peniophora cinerea* (Fr.) Cke.: on 4 Man [93, p. 77].

- P. incarnata* (Pers. ex Fr.) Karst. and *P. ludoviciana* Burt: on 4 Man [93, p. 78].
- P. rimicola* (Karst.) Höhn. & Litsch.: on wood of *F. sp.* and on *Fomes conchatus* (q.v.) Ont [497]; see *Acer*.
- P. sambuci* (Pers.) Burt: on *F. sp.* Man [93, p. 78]; see *Acer*.
- Perichaena quadrata* Macbr.: on wood of *F. sp.* Man [93, p. 26].
- Phoma infossa* Ell. & Ev.: on 1 Ont F59:65.
- Phyllactinia guttata* (Fr.) Lév. (*P. corylea* (Pers.) Karst.): powdery mildew, blanc: on 3 Que 31:121; on 4 Ont 44:100.
- Pistillaria ?clavulata* Ell.: on leaves of 4 Man [93, p. 79].
- Pleurotus applicatus* Fr.: on old *F. sp.* Man [93, p. 93].
- P. lignatilis* (Pers. ex Fr.) Gill.: on old wood of *F. sp.* Man [93, p. 94].
- Polyporus resinosus* Schrad. ex Fr.: on *F. sp.* NB [1138].
- Poria vaillantii* (DC. ex Fr.) Cke.: on 4b Sask [93, p. 85].
- Propolis faginea* (Schrad.) Karst.: on *F. sp.* Man [93, p. 42].
- Puccinia sparganioides* Ell. & Barth. (*P. peridermiospora* (Ell. & Tracy) Arth.): rust, rouille: 0 I on 1 Ont [828], Que NB 31:81, NS 32:82, PEI 52:104; on 3 NS 39:98; on 4 Man 42:93; on 4b Sask [15, p. 165], Man 44:100, NB 45:102; may cause severe injury NS 51:105, 55:116, F54:24.
- Rosellinia medularis* (Wallr.) Ces. & de Not.: on old *F. sp.* Man [93, p. 51].
- Sphaerographium fraxini* Sacc. (stat. conid. of *Durandiella fraxini*, q.v.): on *F. sp.* Que 33:112; on 1, 4 NS [1138]; on 3 Ont F58:59.
- Sphaeropsis fertilis* Pk.: on twigs of 4 Man [93, p. 140].
- Sporidesmium compositum* Berk. & Curt.: on twigs of *F. sp.* Man [93, p. 127].
- Stereum murrayi* (Berk. & Curt.) Burt: white spongy rot, carie blanche spongieuse: on *F. sp.* NB F53:26.
- Valsa ambiens* (Pers. ex Fr.) Fr.: on 4 Man [93, p. 57].
- V. fraxinina* Pk.: on 4 Man [93, p. 58].
- V. leucostoma* (Pers.) Fr.: canker, chancre cystosporéen: on *F. sp.* Sask F52:97.
- Verticillium sp.*: on 1 Ont 42:93.

Freesia Klatt

IRIDACEAE

Common herbs of S. Africa, much grown under glass by florists.

1. *F. hybrida* Hort.; cultigen derived from *F. refracta* Klatt and other species.

Sclerotinia sclerotiorum (Lib.) de Bary: cause of a stem rot of *F. sp.* Man 34:84.

Stromatinia gladioli (Drayton) Whetz.: on bulbs of *F. spp.* imported from s. Europe [264].

Bean yellow mosaic virus (phaseolus virus 2): bean yellow mosaic, mosaïque jaune du haricot: of *F. sp.* in corms imported from Calif into Ont 47:108.

Low-temperature injury: blindness of *F. sp.* attributed to storage of corms at too cool a temperature Ont 40:92.

Fritillaria L.

LILIACEAE

Bulbous herbs of w. N. America, also in Europe and Asia.

1. *F. imperialis* L., crown imperial, couronne impériale; native to Iran and the Himalayas.
2. *F. kamtschatcensis* (L.) Ker-Gawl, black lily, lis noir; coastal Oregon, BC, Alaska and s.e. Asia.
3. *F. lanceolata* Pursh; BC south into the US.

Botrytis cinerea Pers. (stat. conid. of *Botryotinia fuckeliana* (de Bary) Whetz.): on 2 BC [963].

Phyllosticta fritillariae Bonar & W.B.Cke.: on 2 Alaska [983].

Uromyces miurae Syd.: III on 2 Alaska [175], Alaska BC [15, p. 277]; on 2 Alaska BC, 3 BC [963, 1199].

Fuchsia L.

ONAGRACEAE

Shrubs or small trees, mostly of Mexico and w. S. America; cult. for their showy flowers.

1. *F. hybrida* Voss (*F. speciosa* Hort.), the common garden fuchsias; cult. as house plants and summer bedding plants, mainly derived from *F. magellanica* Lam. from s. Chile and *F. fulgens* DC. from Mexico.

Botrytis cinerea Pers.: on *F. sp.* Alaska [175].

Fusarium oxysporum Schlecht: from decayed roots of 1 Man [335].

Pucciniastrum epilobii Otth (*P. pustulatum* (Pers.) Diet.): on 1 Alaska [175].

Verticillium albo-atrum Reinke & Berth.: on 1 BC 58:115.

Gaillardia Foug.

COMPOSITAE

Annual or perennial herbs mostly native to w. N. America.

1. *G. aristata* Pursh; Man to BC, sparingly adventive and escaped from cult. eastward.
2. *G. pulchella* Foug.; Colo and NM to Va. The form usually cult. is 2a, *G. p.* var. *picta* Gray.

Cladosporium sp.: on *G. sp.* Alaska [175].

Entyloma compositarum Farl. (non *E. polysporum* (Pk.) Farl.): leaf smut, charbon des feuilles: on 1 Sask Man Ont [946], Man [93, p. 61], Sask Ont 43:106; also as *E. sp.* on *G. sp.* BC [535; cf. 292].

Fusarium oxysporum Schlecht.: from basal parts of apparently healthy plants of 1 Man [335].

Mycosphaerella tassiana (de Not.) Johans.: on 1 BC [50].

Pleospora penicillus (Schm.) Fckl. (*P. angustata* Wehm.): on 1 BC [50].

?*Sclerotinia sclerotiorum* (Lib.) de Bary: probable cause of crown rot of 1 Man 38:101.

Aster yellows virus (callistephus virus 1): aster yellows, jaunisse de l'aster: on 1 Ont 43:107, NB 30:86, 33:67, PEI 38:101; on 2a BC 50:124.

Galanthus L.

AMARYLLIDACEAE

Bulbous plants native to Europe and w. Asia.

1. *G. elwesii* Hook.f., giant snowdrop; native to Asia Minor.
2. *G. nivalis* L., common snowdrop, perce-neige; blooming in earliest spring, central and s. Europe to the Caucasus.

Rhizoctonia solani Kühn.: cause of stem and bulb rot of 1 BC 57:125.

Galeopsis L.

LABIATAE

Annual herbs native to Eurasia and n. Africa.

1. *G. tetrahit* L., hemp nettle, gratte; native to Eurasia, widely distributed as a weed in Canada, especially in parts of the prairies.

Erysiphe galeopsidis DC. ex Méral: on 1 Sask [93, p. 44].

Septoria galeopsidis West.: on 1 BC [535], Alta 34:101, Man [93, p. 138].

Galium L.

RUBIACEAE

Slender herbs in various parts of the world; some used in rockeries and flower beds.

1. *G. aparine* L., cleavers, herbe collante; Nfld and NS to Alaska and in Eurasia, native and introduced.
2. *G. asprellum* Michx., rough bedstraw; Nfld and NS to w. Ont.
3. *G. boreale* L., crosswort; NS to Alaska and in Eurasia.
4. *G. palustre* L.; Nfld and NS to Ont; also in Eurasia.
5. *G. trifidum* L., dyer's cleavers, tissavoyane rouge; Labr, Nfld and NS to Alaska.
6. *G. triflorum* Michx., trailing cockspur; Greenl, Nfld and NS to Alaska, and in Eurasia.

Ceratobasidium anceps (Bres. & Syd.) Jackson: on 6 Ont [495].

Cercospora galii Ell. & Holw.: on 6 Alaska [175], Alaska BC [341].

Erysiphe cichoracearum DC.: on *G. sp.* Man [93, p. 44].

Fusarium acuminatum Ell. & Ev. and *F. oxysporum* Schlecht.: from discolored roots of 3 Man [335].

Hainesia borealis Ell. & Ev.: on 3 BC Sask 34:101, BC [1199].

Leptotrochila verrucosa (Wallr.) Schüepp [973, p. 257] (non *Pseudopeziza repanda* (Fr.) Karst.): on 6 Man [93, p. 41].

Peronospora borealis Gäum. (*P. calotheca* de Bary, s. lat.): on 3 Sask Man [93, p. 30].

Phoma elliptica Pk.: on stems of 3 Sask 30:95, [93, p. 134].

Placosphaeria punctiformis (Fckl.) Sacc. (imp. state of *Leptotrochila verrucosa*, q.v.): on leaves of 3 Sask. 6 Man [93, p. 136].

Galium

- Puccinia punctata* Lk.: 0 I II III on *G. sp.*, 2, 4 Ont [828]; on *G. sp.*, 5 Man [93, p. 70]; on *G. sp.*, 2 PEI 34:101; on 2 Ont NS [15, p. 260]; on 4 Que [197]; on 5 BC [1198].
- P. punctata* var. *troglodytes* (Lindr.) Arth.: 0 I unknown, II III on 6 BC [1199], Man [93, p. 70], Ont [828], [cf. 15, p. 260].
- P. rubefaciens* Johans.: III on 3 Alaska [175], BC [1198], Yukon [14], Alta [15, p. 261], Sask Man [93, p. 70], Ont [828].
- Pucciniastrum guttatum* (Schroet.) Hylander, Jørstad & Nannf. (*P. galii* E.Fisch.): II III on 6 BC [15, p. 19], Ont [828].
- Septoria psilostega* Ell. & Mart.: on 3, 6 Man [93, p. 139].
- Stagonospora galii* Fautr.: on 4 Que [197].

Gardenia Ellis

RUBIACEAE

Evergreen shrubs of subtropical regions of the eastern hemisphere.

- G. jasminoides* Ellis, gardenia or Cape jasmine, gardenia; native to China, cult. in the open in s. US and Calif, and under glass for its fragrant camellia-like cut flowers. Also 1a, *G. j.* var. *fortuniana* Lindl. (*G. ?veitchii* Hort.).
- Phomopsis gardeniae* Hansen & Barrett: canker, chancre phomopsien: on *G. sp.* Ont; on 1a Que 41:91.
- Pseudomonas gardeniae* (Burkh. & Pirone) Dowson: bacterial leaf spot, tache bactérienne: on *G. sp.* Ont 43:107.
- Bud drop, chute des boutons: physiological, physiologique: on *G. sp.* BC 58:116, Ont 50:124.

Gaultheria L.

ERICACEAE

Evergreen shrubs or rarely small trees, native to N. and S. America, Asia and Australia.

- G. ovatifolia* Gray; BC to Idaho and Oregon.
 - G. procumbens* L., teaberry, petit thé des bois; in Canada from Nfld to Man.
 - G. shallon* Pursh, salal or shallon; Alaska to BC and Calif.
- Asterella gaultheriae* (Curt.) Sacc. (*Schizothyrium g.* (Curt.) Höhn.): on 2 Ont 31:121; on 3 BC [50].
- Bulgaria melastoma* (Sow.) Seav.: on 3 BC [1198].
- Lachnella gaultheriae* (Ell. & Ev.) Seav. [979, p. 256] (*Dasyscyphus g.* Ell. & Ev.): on 3 BC 33:112.
- Leptosphaeria gaultheriae* Dearn.: on 3 BC [50].
- Meliola sp.*: on 1 BC [1198].
- Mycosphaerella gaultheriae* (Cke. & Ell.) House: on 3 Alaska [175].
- Phacidium gaultheriae* Dearn.: on *G. sp.* Alaska [175]; on 3 BC [535].
- Phyllosticta gaultheriae* Ell. & Ev.: leaf spot, tache des feuilles: on 3 BC 33:112, [1198], common [535].
- Poria ferrea* (Pers.) Bourd. & Galz.: on 3 BC [1198].
- Venturia gaultheriae* Ell. & Ev.: on leaves of 2 Ont [93, p. 56], NS [1138].

Gaura L.

ONAGRACEAE

Small herbs of the warm regions of N. America, sometimes grown in the hardy border.

- G. coccinea* Pursh; in Canada from Man to Alta.
- Fusarium oxysporum* Schlecht.: from basal parts of apparently healthy plants of 1 Man [335].
- Uromyces plumbarius* Pk.: 0 I II III on 1 Alta Sask [15, p. 249], Sask Man [93, p. 73].

Gaylussacia HBK.

ERICACEAE

Deciduous or evergreen shrubs native to N. and S. America.

- G. baccata* (Wang.) K.Koch, black huckleberry, gueules noires; in Canada from Nfld and NS to Sask.
- Exobasidium* affn. *vaccinii* Wor.: on 1 Ont Que NS [958; cf. 1138].
- Microsphaera penicillata* (Wallr. ex Fr.) Lév. var. *vaccinii* (Schw.) W.B.Cke. (*M. alni* (Wallr.) Wint. var. v. (Schw.) Salm): on 1 NS [1138].
- Synchytrium vaccinii* Thomas: on 1 NS 38:80, [1138].

Gentiana L.

GENTIANACEAE

Herbs of cool and temperate regions and in mts. in the tropics.

- G. affinis* Griseb., (aff. *G. interrupta* Greene); in Canada in Man to Alta.
 - G. algida* Pall. (*G. ?frigida* Haenke, *G. romanzovii* Ledeb.); Alaska and Yukon, also in the US.
 - G. andrewsii* Griseb.; in Canada from Que to Man.
 - G. calycosa* Griseb.; in BC and Alta, and s. into the US.
 - G. glauca* Pall.; Alaska, Yukon and BC.
 - G. nivalis* L.; Greenl and Labr; also in Europe.
 - G. sceptrum* Griseb.; BC to Wash and Calif. Strictly not belonging here but so treated.
 - G. amarella* L., and 8a, *G. a.* var. *acuta* (Michx.) Herder (*G. stricta* Howell, *G. strictiflora* (Rydb.) Nels., *Gentianella a.* (L.) Börn. ssp. *acuta* (Michx.) J.M.Gillett), felwort; Labr, Nfld, NB and Que to Alaska and Calif.
 - G. tenella* Rottb. (*Gentianella t.* (Rottb.) Börn.); Greenl, Que, Keew, Mack, Alaska; also in US.
- Other host: 10, *G. detonsa* Rottb. (*G. serrata* Gunn.).

Asteroma gentianae auct. Am.: on 3 Man [93, p. 132].
Botrytis cinerea Pers.: on 6 Greenl [900].
Heteropatella umbilicata (Pers. ex Fr.) Jaap (*Septoria cercosperma* Rostr.): on 6 Greenl [900].
Mycosphaerella tassiana (de Not.) Johans. (*Sphaerella pachyasca* Rostr.): on 6 Greenl [900].
Phyllosticta gentianellae Massal.: on 8 Nfld [604].
Platyspora pentamera (Karst.) Wehm. (*Pleospora platyspora* sensu Rostr.): on 9 Greenl [900].
Pleospora penicillus (Schm.) Fckl. var. *p.* (*Pyrenophora chrysospora* (Niessl) Sacc.): on 6, 10 Greenl [900].
Puccinia gentianae (Str.) Röhling: 0.1 II III on 1 Sask [93, p. 68]; on 1 Sask, 2 Alaska, 3 Ont [15, p. 322]; on 8 Que [197], [cf. 175, 828].
P. haleniae Arth. & Holw.: III on 8a Ont [93, p. 69; cf. 15, p. 252].
Sphaerulina gentianae Wehm.: on 4 BC [50].
Synchytrium sp.: on 7 BC [541].
Uredo alaskana (Mains) Cumm. (*Puccinastrum alaskanum* Mains): on 5 Alaska [175].
Uromyces eugentianae Cumm. (*U. gentianae* Arth.): on 8a Sask [93, p. 72; cf. 15, p. 323].
Venturia atriseda Rehm: on 4 BC [50].

Geranium L. GERANIACEAE

Annual or perennial herbs of the temperate regions around the world; some are annuals and weeds, and a few of the perennials are cult. in the herbaceous garden.

1. *G. endressii* J. Gay; native to the Pyrenees, cult.
 2. *G. erianthum* DC., northern cranesbill; Alaska, BC, Alta; also e. Asia.
 3. *G. maculatum* L., alumbloom, racine d'alun; in Canada from Que to Man.
 4. *G. platypetalum* Fisch. & Mey.; s.w. Asia; cult.
 5. *G. pratense* L., meadow pea; cult. and naturalized from Europe in Canada from Labr, Nfld, NS and Que.
 6. *G. pusillum* L.; naturalized from Europe into Ont, Man and BC.
 7. *G. robertianum* L., herb Robert, herbe à Robert; Nfld and NS to Ont and BC; also in Eurasia and n. Africa.
 8. *G. sanguineum* L., blood-red cranesbill; cult. and tending to spread; introduced from Europe.
 9. *G. sylvaticum* L.; Europe; cult.
 10. *G. viscosissimum* Fisch. & Mey.; Sask to BC and south into the US.
- Other hosts: 11, *G. albiflorum* Ledeb. 12, *G. anemonifolium* L'Hérit.

Botrytis cinerea Pers.: on *G. sp.* Alaska [175].
Mycosphaerella tassiana (de Not.) Johans.: on 2 BC [50].
Plasmopara geranii (Pk.) Berl. & de Toni: on 3 Man [93, p. 31].

Puccinia leveillei Mont.: on *G. sp.*, 2 Alaska [175]; on 2 Alaska [15, p. 307].
P. polygoni-amphibii Pers.: 0 I on 3 Ont [15, p. 232].
Ramularia geranii (West.) Fckl.: on 2 Alaska [175, 983].
Sphaerotheca macularis (Wallr. ex Fr.) Magn. (*S. humuli* (DC.) Burr.): on 1 BC [50].
Stigmatea robertiani Fr.: on living leaves of 6 BC [50]; on 7 Ont 31:121, NS [956].
Uromyces geranii Lév.: rust, rouille: 0 I II III light on 1, 5, heavy on 4, 9, 11, 12 Ont 35:67, 38:101; on *G. sp.* NB 42:100; on 2 Alaska [15, p. 245]; on 5 PEI 41:92, [cf. 1138].
Venturia circinans (Fr.) Sacc.: on 2 Alaska [175].
Xanthomonas pelargonii (N.A.Brown) Starr & Burkh. (*Phytomonas geranii* Burkh.): bacterial leaf spot, tache bactérienne: on 8 Man 37:76.

Geum L. ROSACEAE

Perennial herbs of cold and temperate regions; cult. in the open for ornament.

1. *G. aleppicum* Jacq.; Eurasia. Represented in N. America by 1a, *G. a.* var. *strictum* (Ait.) Fern. (*G. strictum* Ait.); NS and Que to BC.
 2. *G. canadense* Jacq.; in Canada from NS to Que.
 3. *G. chilense* Balb.; Chile; cult.
 4. *G. macrophyllum* Willd., bloodroot; Labr, NS to Alaska; also in Europe and Asia.
 5. *G. triflorum* Pursh, three sisters; Ont to Alta.
- Other host: 6, *G. turbinatum* Rydb.

Cylindrosporium gei Farl. (*Cercospora gei* Dearn. & Bisby): on 1a Man [93, p. 115, 129].
Discosia artocreas Tode ex Fr.: on old leaves of 1a Man [93, p. 133].
Erysiphe polygoni DC. ex Mérat: on 4 Alaska [175].
Eurotium herbariorum (Wigg.) Lk.: on *G. sp.* Alaska [175].
Leptosphaerulina pulchra (Wint.) Barr (*Pleospora oligasca* Bubák): on 5 BC [50].
Mycosphaerella caulicola (Karst.) Lind: on 2 Que [53].
Peronospora gei Syd. ex Gäum.: downy mildew, mildiou: on 1a, 5 Man [93, p. 30]; on seed crop of 3 BC 47:108.
Phyllosticta decidua Ell. & Kell.: on 1a Man [93, p. 135].
Puccinia sierversae Arth.: III on 6 Alaska [175; cf. 15, p. 295].
Ramularia gei (Eliass.) Lindr.: on leaves of 5 Man [93, p. 124].
Septoria gei Rob. & Desm.: on *G. sp.* Alaska [175]; on 4 BC [982].
Sphaerotheca macularis (Wallr. ex Fr.) Magn. (*S. humuli* DC.): on 1a, 4 Man [93, p. 44].
Ustacystis waldsteiniae (Pk.) Zundel (*Urocystis w. Pk.*): on 5 Sask [93, p. 61; 292].

Gladiolus L. IRIDACEAE

Cormous plants of the Mediterranean region, also tropical and s. Africa.

Gladiolus

1. *G. hortulanus* Bailey, a complex cultigen derived from \times *G. gandavensis* van Houtte and others.

Alternaria fasciculata (Cke. & Ell.) Jones & Grout: leaf spot, tache des feuilles: on 1 Ont 51:113.

A. tenuis auct. sensu Wiltshire: leaf spot, tache des feuilles: on 1 Ont 49:104.

Botryotinia draytonii (Buddin & Wakef.) Seav. (stat. conid. *Botrytis gladiolorum* Timmerm.): core rot, pourriture botrytique: on 1 BC 45:113, Alta 55:122, Sask 43:107, Ont 40:92, Que 46:84, NS 48:108, PEI 49:105. Core rot of the corm, the storage phase of the disease is very destructive, but stem rot symptoms may also occur in the field.

Botrytis cinerea Pers.: on 1 Alaska [175].

Corynebacterium fascians (Tilf.) Dowson: fasciation, fasciation: on 1 Sask 50:124, 55:122; the pathogen was isolated and caused typical symptoms on *Lathyrus odoratus* and 1. C.S. Ramamorthi (Rev. Appl. Myc. 37:328. 1958) believes the organism to be a *Nocardia*.

Curvularia trifolii (Shear) Boed. f. sp. *gladioli* Parmelee & Luttrell [826, p. 556] (*C. lunata* auct. non (Wakker) Boed.): leaf spot and corm rot, curvulariose: on 1 Ont 54:132, Que 52:113, [825]; probably most important as a corm rot in storage although infection occurred in the field.

Erwinia carotovora (L.R. Jones) Holland: soft rot, pourriture molle bactérienne: a destructive outbreak occurred in 1949, Ont 50:125, [565].

Fusarium oxysporum Schlecht. f. *gladioli* (Massey) Snyder & Hansen (*F. o.* var. *g.* Massey, *F. orthoceras* Wr. var. *g.* McCull.): yellows and corm rot, jaunisse fusarienne: the only organism regularly isolated from roots and corms of plants affected by yellows in the field and from shrunken corms in storage was *F. oxysporum* f. *gladioli* in Sask Man Ont [335]. From decayed corms, etc., were also isolated *F. acuminatum* Ell. & Ev., *F. concolor* Reg., *F. poae* (Pk.) Wr., Man; *F. solani* (Mart.) App. & Wr., Man Ont [335].

Undoubtedly one of the most serious diseases of *G.*, as a root rot in Alta 40:92, Sask Man 37:76, PEI 33:68; as a corm rot in BC 49:104, Man 38:102, Ont PEI 43:107, NB 29:68 and of imported corms 54:125; and as yellows in Alta 44:109, Man Ont PEI 38:101, Que 46:84, Nfld 53:117.

?*Heterosporium montenigrinum* Bubák: on 1 Alaska [175].

Penicillium gladioli McCull. & Thom: storage rot, pourriture pénicillienne: on 1 BC 29:68, Alta 43:107, Sask 49:105, Man PEI 38:102, Man [93, p. 123], Ont 33:68, Que 44:109, Nfld 53:117.

Pseudomonas marginata (McCull.) Stapp: scab, gale bactérienne: on 1 BC Sask Ont NS 25:70, Alta Que NB 31:93, Man 27:96, PEI 32:89; repeatedly reported and damage occasionally severe.

Septoria gladioli Pass.: corm hard rot and leaf spot, septoriose: on 1 BC NB 31:93, Alta 34:84, Man [231], Ont 24:55, 46:84, Que 42:100, NS 47:109, PEI 32:89; occasionally destructive.

Stromatinia gladioli (Drayton) Whetz. (*Sclerotinia g.* Drayton [264, p. 400]; stat. steril. *Sclerotium g.* Massey): corm dry rot, and leaf and stalk rot, pourriture sclérotique: on 1 BC 32:89, Alta 33:68, Sask 44:109, Ont 24:55, Que 51:113, NB 46:84, NS 56:127; a destructive disease particularly in commercial plantings.

Urocystis gladiolicola Ainsw. (non *U. gladioli* W.G.Sm.): smut, charbon: on imported corms of 1 Sask [93, p. 126]. Despite the omission of the record by Fischer

[292], the plant from the imported corm is infected by the smut, not by a *Papulaspora*.

Verticillium albo-atrum Reinke & Berth.: on corms of 1 Que 56:127.

Xanthomonas gummisudans (McCull.) Dowson: bacterial blight, brûlure bactérienne: on corms of 1 Ont, first in 1927, 33:68, also in Man 35:87, Alta 37:76; not common but occasionally severe.

Virus diseases: Berkeley [75] isolated bean yellow mosaic virus (bean virus 2) and tobacco ring spot virus (three strains) with nearly equal frequency and cucumber mosaic virus somewhat less often from 1 in Ont. Mixed infections are probably common. Mosaic, or leaf spot, was recorded: BC 30:87, Man 33:68, Ont 38:102, Que 45:113, NB 41:92, NS PEI 50:125; the plants exhibit a variety of symptoms Ont 52:114, and in one 4-acre block of over 1,300 corms 20% were affected, 52:114. Tobacco mosaic virus was noted once in Ont 50:125, and bean yellow mosaic virus (phaseolus virus 2) was demonstrated in NB 48:108. Aster yellows virus is reported only from Man 57:125, but was detected once in Ont (Thompson in litt.). Probably cucumber mosaic virus is on the increase and because commercial growers in Canada mostly import their corm supply from the s. US, the virus picture in Canada follows closely the pattern in the US (Thompson).

Chemical injury: use of impure naphthalene to control thrips caused lesions on the corms resembling hard rot Ont 49:105.

Corm ring rot: observed at Vineland, Ont, but cause undetermined; some corms unfit for sale [689].

Glaux L.

PRIMULACEAE

A low and leafy fleshy perennial of the northern hemisphere.

1. *G. maritima* L., black saltwort, herbe au lait; Que to Sask and BC.

Puccinia aristidae Tracy: 0 I on 1 Sask [15, p. 159; 93, p. 66].

P. distichlidis Ell. & Ev.: 0 I on 1 Sask [15, p. 167; 93, p. 67].

Gleditsia L.

LEGUMINOSAE

Trees, usually armed with spines, of N. and S. America, Asia and Africa; planted as ornaments.

1. *G. macrantha* Desf.; native to China; cult.
2. *G. triacanthos* L., honey locust, épine; apparently a native of s. Ont, common in cult. and established in NS; wood useful but supply limited.

Camarosporium robiniae (West.) Sacc.: on 2 Ont F63:69.

Cucurbitaria elongata (Fr.) Grev.: canker, chancre cucurbitarien: on 2 Ont 51:105.

Fomes ignarius (L. ex Fr.) Kickx: on 2 Ont F55:59.

Ganoderma lucidum (Leyss. ex Fr.) Karst.: cause of a soft spongy white rot of broad-leaved trees: from 1 Ont [791].

Lachnum: sp.: on *G.* sp. BC [1198].

Microsphaera penicillata (Wallr. ex Fr.) Magn. (*M. alni* (Wallr.) Salm.): on 2 Ont 25:64.
Polyporus picipes Fr.: on *G. sp.* BC [1198].

Glyceria R.Br.

GRAMINEAE

Aquatic perennial grasses of N. America, Eurasia and Australia.

1. *G. borealis* (Nash) Batchelder, floating grass; Nfld and NS to Yukon and Alaska.
2. *G. canadensis* (Michx.) Trin.; Nfld to Que and Ont.
3. *G. fluitans* (L.) R.Br., manna grass, herbe à la manne; sparingly introduced from Eurasia; in Nfld, NS and Que.
4. *G. grandis* Wats.; Nfld to Mack, Yukon and Alaska.
5. *G. pallida* (Torr.) Trin.; NS to Ont; also in e. Asia.
6. *G. pauciflora* Presl; Alaska south to Calif and SD.
7. *G. striata* (Lam.) Hitchc.; Nfld to BC.

Ascochyta sorghi Sacc. (*A. graminicola* Sacc.): on 4 Man [93, p. 131].

Claviceps purpurea (Fr.) Tul. (including *C. microcephala* (Wallr.) Tul.): ergot, ergot; on 1 Alta 54:53, [172], Man [93, p. 45], Que 34:101; on 6 Alaska [175, 1037, 1042], [cf. 1034].

Colletotrichum aquatilis Sprague and *C. graminicola* (Ces.) Wils.: on 6 Alaska [1042].

Epichloë typhina (Pers.) Tul.: choke, quenouille: on 7 Ont 53:51.

Fusarium avenaceum (Fr.) Sacc.: in lesions of *Septoria avenae* (q.v.): on 4 Alaska [1042].

F. nivale (Fr.) Ces.: on 1 Alaska [1037].

Hendersonia crastophila Sacc.: on 1 Alaska [1037].

Passalora graminis (Fckl.) Höhn.: on 4 NB 60:82.

Phaeoseptoria festucae Sprague: on 6 Alaska [1042].

Puccinia graminis Pers.: II III on 4 Ont [15, p. 175].

P. recondita Rob. ex Desm. (*P. rubigo-vera* Wint.): II III on 4 Que [15, p. 180].

Ramularia pusilla Ung. (*Ovularia p.* (Ung.) Sacc. & D.Sacc.): on 6 Alaska [1037].

Septoria avenae Frank: on 2 Ont [1041]; on 2, 7 NB 60:82.

Stagonospora glycericola Sprague: on 5 Que [1041].

Ustilago davisii Liro: on 3 Ont [292]; probably the host was misdetermined.

U. longissima (Sow.) Tul.: on leaves of 4 Alta 31:121, Sask Man [93, p. 62], BC Alta Sask Man Ont Que [292], NB 60:82.

Glycine L.

LEGUMINOSAE

Mostly twining plants of tropical or warm-temperate regions of the Old World; one much cult.

1. *G. max* (L.) Merr., soybean, fève soja; native to China and Japan; grown for forage, human food and oil.

Alternaria tenuis auct. sensu Wiltshire: on leaves of 1 Ont 43:32, 44:32.

Ascochyta spp.: leaf spot, tache des feuilles: on 1 BC 42:29, Ont NS 43:32.

Botrytis cinerea Pers. or *B. sp.*: gray mold, moisissure grise: on 1 Ont 54:46, [446].

Cephalosporium gregatum Allington & Chamberlain: brown stem rot, pourriture brune de la tige: on 1 Ont 47:34, 48:30; favored by cool weather, 56:40. Although rarely severe the disease is spreading, 53:44; and probably lowers yield by hastening maturity of the crop, 57:42.

Cercospora kikuchii Matsumoto & Tomoyasu: purple stain, graine pourpre: on seed of 1 Ont 59:33.

C. sojae Hara (*C. daizu* Miura): frog-eye spot, tache ocellée: on 1 Ont 43:31; apparently a minor parasite, 45:39.

Colletotrichum glycines Hori [*C. dematium* (Pers. ex Fr.) Grove f. *truncata* (Schw.) Arx]: anthracnose, anthracnose: on 1 Ont 42:29, 43:32.

Coryneospora cassiicola (Cke. & Ell.) Wei: on 1 Ont [976].

Diaporthe phaseolorum (Cke. & Ell.) Sacc. var. *caulivora* Athow & Caldwell (*D. p.* var. *?batatatis* (Harter & Field) Wehm.): stem canker, chancre de la tige: possibly present in 1942 on 1 in Ont 42:29, later undoubtedly present, 49:39, and so reported in 1951, 51:33; severe 1949-51, 53:43; cultivar differences in disease incidence noted, 51:33. Because of a change to disease-escaping cultivars, notably Harosoy, the disease has become of little economic importance; however, germination of seed of the 1959 crop was seriously impaired, in part from the high incidence of *D. phaseolorum* on the seed, 59:31, 34, [1127].

D. phaseolorum var. *sojae* (Lehm.) Wehm.: pod and stem blight, brûlure phomopsienne: on 1 Ont 42:29; originally considered to be a destructive pathogen, but probably from confusion with *D. p.* var. *caulivora* (q.v.); later thought to be of negligible economic importance, 51:33, [444], but reduction of yield could occur if plants became infected by mid-August, 52:36; the exact relation of the two *Diaporthes* to one another is not clear.

Fungi from seed: of 1: *Alternaria tenuis* auct. sensu Wiltshire, Que; *Bipolaris sorokiniana* (Sacc. in Sorok.) Shoem., Man; *Botrytis cinerea* Pers., Ont; *Chaetomium cochliodes* Pall., Que; *C. funicola* Cke., Man; *C. globosum* Kze., Ont; *Cladosporium cladosporioides* (Fres.) De Vries, BC; *Diaporthe phaseolorum* (Cke. & Ell.) Sacc., BC Ont; *Epicoccum nigrum* Lk., BC [374]. *Fusarium equiseti* (Cda.) Sacc., BC Ont Que; *F. moniliforme* Sheldon, Ont; *F. poae* (Pk.) Wr., Ont Que [334]. *Myrothecium verrucaria* (Alb. & Schw.) Ditm., *Nigrospora sphaerica* (Sacc.) Mason, Ont; *Penicillium flavido-marginatum* Biourge, *Petriella asymmetrica* Curzi, Man; *Sordaria fimicola* (Rob.) Ces. & de Not., Ont; *Stemphylium botryosum* Wallr., BC; *Stysanus fime-tarius* Karst., *Trichoderma viride* Pers., Ont; *Trichothecium roseum* Pers., Man [374].

Fusarium spp.: cause of wilt of 1 BC 24:32; or of root-rot Man 24:43.

F. oxysporum Schlecht. f. *tracheiphila* (E.F.Sm.) Snyder & Hansen: wilt, flétrissure fusarienne: on 1 Ont 42:30, prevalent in 1943, 43:29.

Fusarium spp.: from diseased plants, mainly the roots: *F. acuminatum* Ell. & Ev., *F. oxysporum*, *F. o.* var. *redolens* (Wr.) Gordon, *F. semitectum* Berk. &

Glycine

Rav., *F. solani* (Mart.) App. & Wr., Man [335; cf. 53:45].

Macrophomina phaseoli (Maubl.) Ashby: charcoal rot, pourriture charbonneuse: on 1 Ont 44:31, 57:42, [453].

Peronospora manshurica (Naoum.) Syd. ex Gäum.: downy mildew, mildiou: on 1 BC 42:30, Ont 35:20, NS 41:20, [1138]; seed treatment greatly reduced infection, 43:29. Systemic infection arose from diseased seed and such plants in turn produced infected seed [451]; systemically infected plants were foci of infection, 45:39, 46:27; cultivars differ in susceptibility, 58:40.

Phyllosticta glycinea Tehon & Daniels (*P. ?phaseolina* Sacc.): cause of a leaf spot of 1 BC 40:25, [535].

P. sojicola Massal.: leaf spot, tache des feuilles: on 1, severe, Ont 43:30; disease increases under continuous cropping, 53:44.

Phytophthora megasperma Drechsl. var. *sojae* Hildebrand: root and stalk rot, mildiou du pied: on 1 Ont 54:46; Harosoy, an otherwise valuable cultivar, is highly susceptible, 56:39, 59:31; for etiology of the disease and description of the pathogen see [445].

Pseudomonas glycinea Coerper: bacterial blight, brûlure bactérienne: on 1 BC 42:30, Alta 37:19, Sask Man [93, p. 28], Man Ont 24:43, Que 34:23, NS 41:23, PEI 45:40. A disease often reported, particularly in plot trials, but apparently rarely severe in Ont; possibly more severe in Man, where unnamed lines proved resistant, 55:44.

Pythium ultimum Trow: stem and root rot, pourriture pythienne: on 1 Ont 51:33; rare, for further details see [442]. A stalk rot caused by a distinct species of *Pythium* was observed on 1 but especially on *Phaseolus vulgaris*, Ont 58:39.

Rhizoctonia solani Kühn: associated with a seedling blight of 1 Ont 50:40, 56:40, and from plants affected by foot rot, Ont 48:30.

Sclerotinia sclerotiorum (Lib.) de Bary: stem rot, pourridié sclérotique: on 1 Man 53:45, Ont 46:28.

Septoria glycines Hemmi: brown spot, tache brune: on 1 Ont 43:31, 44:32; often assumes epidemic proportions in Ont, and a histological study of the host upon infection of this seed-borne pathogen was made [667].

Xanthomonas phaseoli (E.F.Sm.) Dowson var. *sojensis* (Hedges) Starr & Burkh.: bacterial pustule, pustule bactérienne: on 1 Man 54:48, Ont 53:44.

Bean yellow mosaic virus (*phaseolus virus* 2): yellow mosaic, mosaïque jaune: on 1 Ont 51:34, Man Ont 57:42.

Beet curly-top virus: beet curly top, frisolée de la betterave: on 1 BC 35:20, 45:40.

Soybean mosaic virus (*soja virus* 1): mosaic, mosaïque: on 1 BC 29:24, Alta 38:23, Sask 42:30, Man 35:20, Ont Que 24:43, NB 33:17, NS 41:23, PEI 39:32; its seed-borne nature probably explains observations in BC 33:17; for characteristic symptoms see 43:31; common and occasionally severe.

Tobacco ring-spot virus: cause of bud blight, brûlure des boutons, of 1 Ont 44:30, (as ?gray fleck, moucheure grise) 43:31, ?Man 57:42; contrary to Canadian experiments, 46:28, demonstrated to be seed-borne in the US [20]. The grape mealybug, *Pseudococcus maritimus* (Ehrh.), may be a vector, Ont 54:47, [446].

Manganese deficiency, carence de manganèse: interveinal yellowing, jaunissure internervale: prevalent on 1 on clay soils in s.w. Ont 53:43; first recorded in 1949, 49:32; prevalent 1948-50, but scarcely apparent in 1951, 51:35. Caused an estimated reduction of yield of 4 bu per acre in 1953, 53:43, and an

important and persistent factor in soybean yields in the areas affected, 56:41. Spraying with manganese sulphate advised when symptoms appear, 53:43.

Potassium deficiency, carence de potasse: on 1 Ont 54:48.

Glycyrrhiza L.

LEGUMINOSAE

Long-rooted perennial herbs of temperate N. and S. America, s. Eurasia, Africa and Australia.

1. *G. lepidota* (Nutt.) Pursh, wild licorice; in Canada from w. Ont to Alta.

Erysiphe polygoni DC. ex Méral: on 1 Man [93, p. 44].

Septoria glycyrrhizae Ell. & Kell.: on 1 Sask [93, p. 138].

Uromyces glycyrrhizae Magn.: 0 I III on 1 Alta [15, p. 306], Sask Man [93, p. 72]; common.

Gnaphalium L.

COMPOSITAE

Woolly herbs of wide distribution.

1. *G. macounii* Greene; NS and Que to BC.

2. *G. norvegicum* Gunn.; Greenl; also in Europe.

Botrytis cinerea Pers.: on 2 Greenl [900].

Diaporthe arctii (Lasch) Nit.: on stems of *G.* sp. NS [1138].

Heteropatella umbilicata (Pers. ex Fr.) Jaap (*Septoria cercosperma* Rostr.): on 2 Greenl [900].

Leptosphaeria rhopalisporea Berl.: on *G.* sp. NS [1138].

Puccinia investita Schw.: 0 I III on 1 Ont [15, p. 265; cf. 828].

Goodyera R.Br.

ORCHIDACEAE

Evergreen plants of the northern hemisphere.

1. *G. oblongifolia* Raf., giant or Menzies' rattlesnake plantain; NS, NB, Que, Ont and BC.

2. *G. repens* (L.) R.Br., adder's-tongue, herbe écartante; Labr, Nfld, NS, Que, Ont, Alta, BC and Alaska.

Uredo goodyerae Tranz.: on 1 BC [1199; cf. 15, p. 12].

Gossypium L.

MALVACEAE

Stout annual or perennial shrubs widespread in tropical regions, several species cult. for the long hairs on the seed and a few grown for ornament.

Pythium sp.: associated with a foot rot of young ornamental cotton plants Man 45:113.

Grevillea R.Br.

PROTEACEAE

Trees or shrubs mostly of Australia; several cult. in warm countries, but only one grown as a pot plant.

1. *G. robusta* Cunn.; a robust tree of Queensland and New South Wales, but grown as a greenhouse plant.

Botrytis cinerea Pers.: on *G.* sp. Alaska [175].

Grindelia Willd.

COMPOSITAE

Perennial or biennial herbs of N. America.

1. *G. squarrosa* (Pursh) Dunal, gumweed, épinette de prairie; in Canada from Man to Alta. 1a, *G. s.* var. *quasiperennis* Linnell (*G. perennis* Nels.); in Canada from Man to Alta and adventive east to Que.

2. *G. stricta* DC.; coastal Alaska and BC to Calif.

Coleosporium asterum (Died.) Syd. (*C. solidaginis* (Schw.) Thüm.): on 2 BC [535, 1198; cf. 15, p. 43].

Erysiphe cichoracearum DC. ex Mérat: on 1 Man [93, p. 44].

Ophiobolus filisporus (Cke. & Ell.) Sacc.: on old stems of ?1 Man [93, p. 55].

Puccinia grindeliae Pk.: III on 1a Alta Sask, common [93, p. 69]; and/or 1 Alta Sask [15, p. 142, 311]. The rust on 1 in Man proved homothallic when cultured; pycnia were entirely lacking, only III being formed [139].

Thecaphora cuneata (Schaf.) Clint.: on 1 Ont [292].

Gypsophila L.

CARYOPHYLLACEAE

Annual or perennial herbs of Europe, Asia and n. Africa; cult. in rock gardens, etc.

1. *G. elegans* Bieb.; annual, cult. and escaped; introduced from Eurasia.
2. *G. paniculata* L., baby's breath, œillet d'amour; perennial, Europe and n. Asia, escaped from cult, especially in the prairies.

Fusarium sp.: associated with a root rot of *G.* sp. Alta 50:126.

Aster yellows virus (callistephus virus 1): aster yellows, jaunisse de l'aster: on *G.* sp. NB 47:100; ?cause of sterility of 1 Ont 46:84.

Habenaria Willd.

ORCHIDACEAE

Glabrous plants mostly of n. temperate regions; only a few hardy species cult. in N. America.

1. *H. dilatata* (Pursh) Hook., bog lily, vanille; Labr, Nfld and NS to Alaska.
2. *H. gracilis* Wats. (*Limnorchis stricta* Rydb.); Alaska to Oregon and Mont.
3. *H. hyperborea* (L.) R.Br. (*Platanthera h.* (L.) Lindl.), marsh lily; Greenl, Nfld and Que to Alaska; also in n.e. Asia.

4. *H. lacera* (Michx.) Lodd; NS, Que and Ont.
5. *H. psychodes* (L.) Spring., blue lily, lilas; Nfld, Que and Ont.
6. *H. saccata* Greene; Alaska to Alta and s. into the US.
7. *H. straminea* Fern. (*H. albida* (L.) R.Br. s. lat.); Greenl and Nfld.
8. *H. viridis* (L.) R.Br.; Nfld and Que to Alaska. 8a, *H. v.* var. *bracteata* (Muhl.) Gray (*H. b.* (Muhl.) R.Br.); Nfld and NS to Alta.

Other host: 9, *H. leucostachys* (Lindl.) Wats.

Botrytis cinerea Pers.: on 7 Greenl [900].

Ceratobasidium anceps (Bres. & Syd.) Jackson: on 8a Ont [495].

Heteropatella umbilicata (Pers. ex Fr.) Jaap (*Septoria cercosperma* Rostr.): on 7 Greenl [900].

Lachnum groenlandicum Rostr.: on 3 Greenl [899, p. 537].

Puccinia praegracilis Arth. (*Aecidium graebnerianum* P.Henn.): 1 on *H.* sp., 1, 3, 6, 8a Alaska [175]; on 1, 3, 8a, 9 Alaska; on 2 Alaska BC [15, p. 383]; on 5 Que [950]; on 5, not 4 NS [950, 956].

P. praegracilis var. *cabotiana* Savile: 1 on *H.* sp., 5 NS, with II III on *Hierochloë odorata*; probably on 5 Que [956].

P. praegracilis var. *connersii* (Savile) Savile (*P. connersii* Savile): 1 on 1 Que with II III on *Deschampsia atropurpurea* [948, p. 665; 950, p. 457].

P. praegracilis var. *praegracilis*: 1 on 2 BC, with II III on *Agrostis thurberiana* [950, p. 457].

Halenia Borkh.

GENTIANACEAE

Small herbs of N. America and Eurasia.

1. *H. deflexa* (Sm.) Griseb., spurred gentian; in Canada from Labr, Nfld and NS to BC.

Cercospora haleniae Chupp & Bisby: on leaves of 1 Man [93, p. 114].

Hackelia Opiz

BORAGINACEAE

Biennial or perennial herbs of N. America and Eurasia.

1. *H. americana* (Gray) Fern. (*Lappula deflexa* (Wahl.) Garcke var. *a.* (Gray) Greene); in Canada from NB, Que and Ont to BC.
2. *H. virginiana* (L.) I.M.Johnston, beggarticks; in Canada in Que.

Ceratobasidium anceps (Bres. & Syd.) Jackson: on 2 Ont [495].

Ramularia lappulae Davis: on leaves of 1 Man [93, p. 125].

Hamamelis L.

HAMAMELIDACEAE

Deciduous shrubs or small trees of N. America and e. Asia.

Hamamelis

1. *H. virginiana* L., witch-hazel, café du diable; a shrub or small tree, NS to Que and Ont; wood is not used commercially in Canada.

Dermea hamamelidis (Pk.) Groves: on 1 Ont [370, p. 396].

Pezicula hamamelidis Groves & Seav.: on 1 Ont F63:70, [365, p. 141].

Stilbospora sp. (*Hendersonia foliorum* Fekl. var. *?hamamelidina* Fairman): leaf spot, tache des feuilles: on 1 NS 52:104.

Haplopappus Endl.

COMPOSITAE

Perennial mostly woody herbs of the dry plains and foothills of w. N. America; also in S. America.

1. *H. brandegei* Gray (?*Erigeron aureus* Greene); Alta, BC and Wash.
2. *H. lyallii* Gray; BC and Alta to Wash and Oregon.
3. *H. spinulosus* (Pursh) DC. (*Sideranthus s.* (Pursh) Sweet); in Canada from Alta to Man.

Mycosphaerella tassiana (de Not.) Johans.: on 1 BC [50].

Pleospora comata Auersw. & Niessl: on 2 BC [50].

P. rainierensis Wehm. (*P. asymmetrica* Wehm.): on 1 BC [50].

Puccinia grindeliae Pk.: III on 3 Sask 30:99, [15, p. 142; 93, p. 69].

Hedera L.

ARALIACEAE

Evergreen shrubs native to Europe and Japan.

1. *H. helix* L., English ivy, lierre commun; native to Europe and extensively naturalized elsewhere; many horticultural forms cult. for wall and ground cover and as house plants.

Colletotrichum trichellum (Fr.) Duke (*Vermicularia trichella* Fr.): leaf spot, anthracnose: on 1 BC 31:92, NS 25:72, [1138].

Fusarium solani (Mart.) App. & Wr.: from diseased basal parts of imported 1 Man [335].

Phyllosticta sp.: cause of a leaf spot of 1 BC [535].

Xanthomonas hederae (Arn.) Dowson (*Phytomonas h.* Arn. ex Burkh. & Guterm.): bacterial leaf spot, tache bactérienne: on 1 Man 46:85, Ont 41:92, Que 51:114; infection may be heavy Ont 50:126.

Hedysarum L.

LEGUMINOSAE

Perennial herbs, rarely shrubs, of the northern hemisphere.

1. *H. alpinum* L. var. *alpinum*; native to Eurasia; represented in N. America by 1a, *H. a.* var. *americanum* Michx. (*H. americanum* (Michx.) Britt.); Nfld, NB and Que to Man, BC and Alaska; and 1b, *H. a.* var. *grandiflorum*

Rollins; Labr, Nfld, Alta, BC, Yukon and Alaska.

2. *H. boreale* Nutt. 2a, *H. b.* var. *cinerascens* (Rydb.) Rollins (*H. c.* Rydb.); Alta, Sask.
3. *H. mackenzii* Richards.; Nfld, Que, Keew to Alaska, south to Man, Alta and BC.
4. *H. sulphurascens* Rydb.; Alta, BC to Wash and Mont.

Peronospora trifoliorum de Bary: on 1a Alaska [983, 1038].

Placosphaeria onobrychidis (DC.) Sacc.: on 3 Man [604].

Pleospora comata Auersw. & Niessl (*Pyrenophora c.* (Niessl) Sacc.): on 3 Yukon [600].

P. herbarum (Fr.) Rabh.: on 3 Man [604].

Uromyces hedysari-obscuri (DC.) Lév.: rust, rouille: 0 I III on *H. sp.*, 1a, 22, 3 Alaska [175]; on 1, 1a Alaska [1038]; on 1a Alaska Alta, 2 Alta Man, 2a, 3, 4 Alta [15, p. 303]; on 1a Alta Sask, 2 Sask Man, 2a Sask [93, p. 72]; on ?2 Que; on 3 Yukon, heavy, probably reducing value of the plant as forage, 54:38; on 4 BC [1203]. Functionally a eu-autoecious rust, secondary aecia replacing uredinia.

Helenium L.

COMPOSITAE

Coarse erect annual or perennial herbs of N. America and Mexico.

1. *H. autumnale* L., sneezeweed, hélénie automnale; in Que and Ont; several cultivars are recognized. 1a, *H. a.* var. *montanum* (Nutt.) Fern. (*H. m.* Nutt.); BC to Man.

?*Corynebacterium fascians* (Tilf.) Dowson: fasciation, fasciation: on 1 Que 47:110.

Entyloma compositarum Farl.: leaf smut, charbon des feuilles: on 1a Sask 43:106, [946].

Septoria ?helenii Ell. & Ev.: on 1 Man [93, p. 138].

Aster yellows virus (callistephus virus 1): aster yellows, jaunisse de l'aster: on 1 NB 47:110.

Helianthus L.

COMPOSITAE

Coarse stout herbs mostly of N. America; a number cult. as ornamentals, one for its edible tubers and another as an oil plant.

1. *H. annuus* L., common sunflower, tournesol; native to s. Alta and south; adventive NS to BC; many named cultigens cult. for economic and ornamental purposes.
2. *H. atrorubens* L.; native to s.e. US, cult. for ornament.
3. *H. decapetalus* L.; in Que; also cult.
4. *H. divaricatus* L.; Que to Sask.
5. *H. giganteus* L.; Que to Alta.
6. *H. laetiflorus* Pers., especially 6a, *H. l.* var. *rigidus* (Cass.) Fern. (*H. r.* (Cass.) Desf.); BC to Ont; also in Que; and 6b, *H. l.* var.

- subrhomboides* (Rydb.) Fern. (*H. s.* Rydb.); Alta to Man, also in Que.
7. *H. maximiliani* Schrad.; Man and Sask.
 8. *H. petiolaris* Nutt. (*H. aridus* Rydb.); BC to Man, adventive eastward.
 9. *H. strumosus* L.; Que.
 10. *H. tuberosus* L., Jerusalem artichoke or girasole, topinambour; Ont to Sask, now generally naturalized through cult.
- Other hosts: 11, *H. californicus* DC. 12, *H. fascicularis* Greene. 13, *H. subtuberosus* Bourq.
- Alternaria tenuis* auct. sensu Wiltshire: from seed of *I* Man [374].
- A. zinniae* Pape: leaf and stem spot, tache alternarienne: on *I* when an outbreak occurred in 1960 on the sunflower crop in Man. The pathogenicity of the fungus and symptoms of the disease are described [686]. Like *A. zinniae* on *Zinnia* (q.v.), the fungus is seed-borne. McDonald & Martens demonstrated that the sunflower pathogen agrees morphologically with *A. zinniae*, but their single trial on *Zinnia* suggests that it is physiologically distinct from the type fungus.
- Ascochyta compositarum* Davis: on *IO* Man [93, p. 131].
- Botrytis cinerea* Pers. (*B. vulgaris* Fr.): gray mold, moisissure grise: on *I* Alta 24:19, Sask Man 43:36, Man 25:23, [93, p. 113]; all parts of the plant above the ground may be attacked; from seed of *I* Man [374, 913].
- Cladosporium cladosporoides* (Fres.) De Vries: from seed of *I* Man [374].
- Dasyscyphus ?sporotrichus* (Oud.) Rehm: on decaying stems of *I* Man [93, p. 39].
- Didymium anellus* Morgan: on old leaves of *H. sp.* Man [93, p. 25].
- Erysiphe cichoracearum* DC. ex Méral: powdery mildew, blanc: on *H. sp.* (cult.) Man 40:93, Que 46:85, NB 60:69; on *I* Man 24:19, Ont 43:36, Que 45:40; on *I* and 2 cult., 4 Man [93, p. 44]; on 3 cult. Ont 43:108; on 7 cult. Man 61:53; on *IO* BC 52:49, Man 44:109, Ont 48:108.
- Fusarium* spp.: from seedlings and older plants of *I*: *F. acuminatum* Ell. & Ev., Sask Man; *F. sambucinum* Fckl., Man; *F. solani* (Mart.) App. & Wr., Sask [335].
- Leptosphaeria doliolum* (Pers.) de Not.: on old stems of *I* Sask Man [93, p. 54].
- Nigrospora sphaerica* (Sacc.) Mason: from seed of *I* Man [374].
- Oedocephalum glomerulorum* (Bull.) Sacc.: on old stems of *I* Man [93, p. 122].
- Papularia sphaerosperma* (Pers.) Höhn.: from seed of *I* Man [374].
- Phoma oleracea* Sacc. var. *helianthi-tuberosi* Sacc.: phoma black stem, tige noire phoméenne: causes blackened areas on bracts and receptacle of the head, and spots on the leaves, stem and petioles of *I* Man [685].
- Plasmopara halstedii* (Farl.) Berl. & de Toni: downy mildew, mildiou: on *I* Sask Man [93, p. 31], Man Ont 24:19, Ont 43:36, Que 34:24, NS 29:23, [1138]; on 6a Miss Mellish Ont 46:85, 49:106; on 6a Sask, 7, 8 Man [93]; on 12 Alta 34:104. Seedlings are systemically infected, remain stunted, and may serve as foci of localized secondary infections, 34:24; primary infection arises through the soil,

44:33; severe outbreaks have occurred sporadically Que 34:24, Ont 43:36, Man 53:49.

Puccinia helianthi Schw.: rust, rouille: 0 I II III on *I* BC-Que 24:19, Alta-Man [93, p. 69], NB 26:11, NS 29:23, [1138]; on ornamental *H. spp.* Sask 36:84, Man 43:108; on *I* Sungold Que 41:92; on 5, 6a, 9, 10 Ont, 8, 12 Alta [15, p. 268]; on 5 Man 33:112; on 6b, 8, 12 Sask, 7, 8, 13 Man [93]; on 8 Sask 31:121; on 3, 7 Ont [828]. Severe outbreaks of rust arose as the acreage of *I* increased Man 38:24, 48:32, and despite the development of high-yielding hybrid sunflowers rust reached a peak in 1951, 51:36; however, resistance was discovered in progeny of natural crosses that occurred in Texas between cult. and wild *I*. From these the rust-resistant cultivar Beacon was developed to be widely grown in Man in 1955 [863]. Rust is still a problem in the large-seeded cultivars grown for the confectionery trade, 58:40.

Distinctive strains of *P. helianthi* were demonstrated to be in part specialized to different species of *Helianthus* [137, 140], 44:35; the morphology of the strains remains to be studied.

Four races were distinguished in Man. As most of the commercial crop then lacked resistance, race 1 was the most prevalent. Rust-resistant selections made at Manfredi, Argentina, proved susceptible to all four Man races, which suggests that other races occur [914]. Two dominant genes for resistance are postulated as a result of inoculations with races 1 (54-6) and 2 (54-3) [865].

Craigie [221], in his classical experiments on the function of pycnia, demonstrated that haploid infections of *P. helianthi* comprised two self-sterile, infertile groups and by transfer of pycniospore-containing nectar from pycnia of one group to that of the other diploidization was accomplished and aecia developed; later he described the nuclear changes in the rust during diploidization of the haploid infections [226]. Brown [136] showed that diploidization could also be accomplished by contact of the mycelium of a haploid infection with the diploid mycelium of a contiguous infection from urediniospore inoculation. Growth of the fungus in the haploid or diploid condition in tissue cultures of the host has been described [798].

Pythium sp.: on seedlings of *I* in greenhouse Que 47:36.

Rhizoctonia solani Kühn: root rot, rhizoctone commun: on *I* Alta 58:42, 59:36.

Sclerotinia sclerotiorum (Lib.) de Bary: sclerotinia rot, flétrissure sclérotique: on *I* BC-Que NS PEI 24:19, Sask 27:31, NB 25:23; on *IO* BC 31:40, 50:57, NB 26:20, 29:29; on *II* cult. PEI 38:103. Occurs mainly as a basal stem rot or wilt, but is also the cause of a head and neck rot Man 51:37; common and sometimes destructive when growth of *I* is rank.

Septoria helianthi Ell. & Kell.: leaf spot, tache septoriennne: on *I* Alta NS 29:23, Sask Man [93, p. 138], Ont 36:19, NS [1138]; on 7, 8, 10 Man [93]; only rarely prevalent on *I* Man 59:36.

Uromyces junci (Desm.) Tul.: 0 I on 6b Sask, 10 Man, 13 Alta [15, p. 217]; on 8 Sask Man [93, p. 73].

Verticillium albo-atrum Reinke & Berth.: leaf mottle, marbrure verticillienne: first noted on *I* in Man 48:32, conspicuous in 1949 and 1953, prevalent and destructive in 1954, 54:49; for detailed account see [916]; also *V. sp.* from roots of *I* Ont 44:35.

Aster yellows virus (callistephus virus 1): aster yellows, jaunisse de l'aster: on *I* Man 53:37, most prevalent in 1953-55 and 1957, 57:43; on *H. sp.* NB 38:86; on 8 Man 55:46. Under a natural epidemic of aster yellows, resistance was observed in some inbred lines of *I*; resistance appeared dominant,

Helianthus

occurring in association with both susceptibility and resistance to rust but mostly with resistance to leaf mottle [864].

Virus: mosaic, mosaïque: on 1 NB 45:40.

Miscellaneous diseases: several syndromes of unknown cause have been recorded on 1 in Man: black stem rot, 53:47; head drop, 51:38, 52:38; stalk rot, 49:35, 51:38, 52:38, 53:46, 55:46; stunt, 48:32, 49:35.

Boron deficiency, carence de bore: on 1 Ont 43:37, NB 44:35.

Chemical injury: by 2,4-D on 1 Man 49:35, 51:38, 54:50.

Heliopsis Pers. COMPOSITAE

Perennial herbs, one annual, native to N. America; several cult. for their showy flowers.

1. *H. helianthoides* (L.) Sweet, ox-eye; in Canada in s. Ont.
2. *H. scabra* Dunal (*H. helianthoides* var. *s.* (Dunal) Fern.); Ont to BC, adventive in Que. Several cultigens including 2a, *H. s.* var. *gratissima* Hort.

Erysiphe cichoracearum DC. ex Méral: powdery mildew, blanc: on *H. sp.* Man 40:93.

Aster yellows virus (callistephus virus 1): aster yellows, jaunisse de l'aster: on 2a Man 44:109.

Helichrysum Gaertn. COMPOSITAE

Annual or perennial herbs or shrubs of Europe, Asia, Africa and Australia.

1. *H. bracteatum* Andr., strawflower or everlasting, immortelle à bractées; native to Australia.

Phyllosticta sp.: leaf spot, tache des feuilles: on 1 PEI 37:75.

Aster yellows virus (callistephus virus 1): aster yellows, jaunisse de l'aster: on *H. sp.* NB 33:67, PEI 43:108; on 1 NB 43:108.

Heliotropium L. BORAGINACEAE

Herbs or sometimes shrubs of warm regions, some widely grown in borders and greenhouses for the fragrant flowers.

1. *H. arborescens* L. (*H. peruvianum* L.), common heliotrope, héliotrope; native to Peru.

Botrytis cinerea Pers.: on 1 Alaska [175].

Cladosporium heliotropii Erikss.: on 1 Alaska [175].

Helleborus L. RANUNCULACEAE

Perennial herbs of Europe and w. Asia; one commonly cult. for ornament.

1. *H. niger* L., christmas rose, hellébore noire

ou rose de Noël; native to Europe, somewhat naturalized.

Coniothyrium hellebori Cke. & Masee: black leaf spot, tache noire: on 1 BC 36:76, 40:93, 53:118, [535].
Eurotium herbariorum (Wigg.) Lk.: on *H. sp.* Alaska [175].

Hepatica Mill. RANUNCULACEAE

Perennial low herbs of the temperate zone of the northern hemisphere.

1. *H. acutiloba* DC., spring beauty, trinitaire; in Canada in Que and Ont.
2. *H. americana* (DC.) Ker (*H. triloba* auct. Am.); in Canada from NS to Man.

Ascochyta vodakii Bubák: on 2 Ont 34:102.

Septoria hepaticae Desm.: leaf spot, tache septorienne: on 2 Que 34:85.

Tranzschelia pruni-spinosae (Pers.) Diet. (*T. ?arthuri* Tranz. & Litv.): rust, rouille: 0 I on 1 Que 34:85, [15, p. 72; cf. 828].

Urocystis anemones (Pers.) Wint.: smut, charbon: on 1 Ont Que NS, 2 Ont [292].

Heracleum L. UMBELLIFERAE

Stout perennial herbs of the northern hemisphere.

1. *H. maximum* Bartr. (*H. lanatum* Michx.), cow parsnip, berce; Labr, Nfld and NS to Alaska.

Cylindrosporium heraclei Ell. & Ev. (*Septoria heraclei* (Lib.) Desm.): on 1 Sask Man [93, p. 129].

Heterosphaeria patella (Tode) Grev.: on *H. sp.* Alaska [175].

Leptosphaeria doliolum (Pers.) de Not.: on *H. sp.* Alaska [175]; on 1 Que [53].

Linocarpon umbelliferarum Barr: on overwintered stalks of 1 Que [53, p. 320].

Ophiobolus anguillides (Cke.) Sacc.: on old stems of 1 Man [93, p. 55].

O. rubellus (Fr.) Sacc.: on 1 Que [53].

Phoma complanata (Tode ex Fr.) Desm.: on *H. sp.* Alaska [175].

Phyllachora heraclei (Fr.) Fckl.: on 1 Alaska [175], Man [93, p. 47].

Phyllosticta heraclei Ell. & Dearn.: on *H. sp.* Alaska [175], Man [93, p. 135].

Pleospora helvetica Niessl: on 1 Que [53].

Ramularia heraclei (Oud.) Sacc.: on *H. sp.*, 1 Alaska [175]; on leaves of 1 Man [93, p. 124].

Sclerotium varium Fr.: on *H. sp.* Alaska [175].

Sphaerographium abditum Sacc. & Scalia: on *H. sp.* Alaska [175].

Hesperis L. CRUCIFERAE

Biennial or perennial herbs of the Mediterranean region and central Asia, one cult. for its bloom.

1. *H. matronalis* L., dame's violet, julienne des dames; Nfld and NS to Ont and westward; escaped from cult. and naturalized from Europe.

Peronospora parasitica (Pers. ex Fr.) Fr. (*P. hesperidis* Gäum.): downy mildew, mildiou: on 1 cult. Ont 44:110, 45:113.

Rhizoctonia sp.: associated with a basal rot and wilt of *H.* sp. cult. Sask 43:108.

Virus: mosaic, mosaïque: on 1 cult. Que 57:126.

Heteranthera Ruiz. & Pav.

PONTEDERIACEAE

Low herbs of the Americas and Africa.

1. *H. dubia* (Jacq.) MacM.; in Canada in Que and Ont.

Membranosorus heterantherae Ostenf. & Peterson: on 1 Ont [93, p. 29].

Heuchera L.

SAXIFRAGACEAE

Perennial herbs of N. America; a few grown in the flower garden.

1. *H. cylindrica* Dougl., including 1a, *H. c.* var. *glabella* (Torr. & Gray) Wheelock (*H. g.* Torr. & Gray); Alta, BC and into the US; and 1b, *H. c.* var. *septentrionalis* R.B. & L.; Alta and BC.
2. *H. glabra* Willd.; Alaska to Oregon.
3. *H. micrantha* Dougl., wild geranium; BC and into the US.
4. *H. ovalifolia* Nutt.; Alta and BC and into the US.
5. *H. richardsonii* R.Br., alumroot; Mack, Alta and Man.

Cercospora heucherae Ell. & Martin: on 5 Man [93, p. 114].

Leptostroma herbarum (Fr.) Lk.: on 2 Alaska [175].

Mycosphaerella punctiformis (Pers. ex Fr.) Starb. var. *clematidis* Jaap: on 2 BC [50].

Phyllosticta excavata Sacc.: on 2 Alaska [175].

Puccinia heucherae (Schw.) Diet.: III on 2 Alaska [175, 1038]; on 5 Man [15, p. 293; 93, p. 69], Ont [828].

P. heucherae var. *heucherae*: III on 1a BC, 2 Alaska BC, 3 varr., and 4 BC [954].

P. heucherae var. *saxifragae* (Schlecht.) Savile: III on 1b BC Alta, 4 BC, 5 Man [954, p. 406].

Sphaerotheca macularis (Wallr. ex Fr.) Magn. (*S. humuli* (DC.) Burr.): on 2 BC [50].

Hibiscus L.

MALVACEAE

Herbs, shrubs and trees, native to tropical and temperate regions of the world; a few yield food and fiber products and some are also cult. for ornament.

1. *H. esculentus* L., okra, gombo; cult. as a vegetable for the soft immature edible pods; native to tropical Africa.

2. *H. syriacus* L., rose of Sharon or shrubby althaea, mauve en arbre; an ornamental erect shrub; native to e. Asia.

Alternaria sp.: associated with a leaf spot of 2 Ont 32:95.

Botrytis cinerea Fr.: on *H.* sp. Alaska [175].

Chaetomium spp.: from imported seed of 1: *C. bostrychodes* Zopf, *C. globosum* Kze., *C. reflexum* Skolko & Groves [374].

Erysiphe cichoracearum DC. ex Mérat: powdery mildew, blanc: on 2 Que 57:126.

Fusarium lateritium Nees: canker, chancre: on 2 Ont 48:108; isolated from sporodochia present [335].

F. oxysporum Schlecht.: from basal parts of stem and from the crown of 2 Ont [335].

Phyllosticta hibiscina Ell. & Ev.: on 1 Man 31:115, [93, p. 135].

P. syriaca Sacc.: leaf spot, tache foliaire: on 2 Que 57:126.

Verticillium dahliae Kleb.: wilt, flétrissure verticillienne: on 1 Ont 41:37, 42:47, 43:52.

Hieracium L.

COMPOSITAE

Perennial herbs of temperate and cold regions.

1. *H. albertinum* Farr; Alta.
2. *H. albiflorum* Hook.; Alaska, Yukon and Sask and south.
3. *H. alpinum* L.; Greenl and Europe.
4. *H. aurantiacum* L., devil's paint brush, Saint Louis; naturalized from Europe, abundant in Ont and Que, known from Nfld, NS, Man, Alta and BC.
5. *H. canadense* Michx.; Lab, Nfld, NS, PEI, Ont to BC.
6. *H. cynoglossoides* Arv.-Touv.; BC and Alta to Wash and Calif.
7. *H. floribundum* Wimm. & Grab., King devil; Nfld to Conn; naturalized from Europe.
8. *H. groenlandicum* Arv.-Touv. (*H. dovrense* auct.); Greenl, Labr, Nfld and Que.
9. *H. pratense* Tausch; NS, Que and Ont; naturalized from Europe.
10. *H. scabrum* Michx.; Que to Ont.
11. *H. umbellatum* L. (*H. scabriusculum* Schw.); Ont to Alaska; also in Europe.
12. *H. vulgatum* Fr.; Nfld, NS, Que and Ont; naturalized from Europe.

Other hosts: 13, *H. lanatum* L. 14, *H. nigrescens* Willd. 15, *H. prenanthoides* Vill.

Aecidium columbiense Ell. & Ev.: 0 1 on 2 BC [15, p. 382].

Hieracium

- Ceratobasidium anceps* (Bres. & Syd.) Jackson: on ?10 Que [495].
- Erysiphe cichoracearum* DC. ex Méral: on 5 Man [93, p. 44].
- Fusarium solani* (Mart.) App. & Wr.: from apparently healthy roots of 5 Man [335].
- Heteropatella umbilicata* (Pers. ex Fr.) Jaap (*Septoria cercosperma* Rostr.): on 3 Greenl [899]; on 15 Greenl [900].
- Leptosphaeria agnita* (Desm.) Ces. & de Not.: on 8, 12 Greenl [899].
- L. doliolum* (Pers.) de Not.: on 9 Que [53].
- Mycosphaerella caulicola* (Karst.) Lind: on 9 Que [53].
- M. tassiana* (de Not.) Johans.: on *H. spp.* BC [50].
- Nectria pedicularis* (Tracy & Earle) Petr.: on 9 Que [53].
- Nodulosphaeria aquilina* (D. Sacc.) Holm: on 9 Que [53].
- N. modesta* (Desm.) Munk (or as *Leptosphaeria m.* Desm.) Karst.: on 13 Que [53].
- Phoma hieracii* Rostr.: on 15 Greenl [900, p. 623].
- Pleospora ambigua* (Berl. & Bres.) Wehm.: on 9 Que [53].
- P. herbarum* (Fr.) Rabh.: on 4 BC [50].
- P. herbarum* var. *occidentalis* Wehm.: on 1 BC [50].
- Puccinia columbiensis* Ell. & Ev. (*P. maculosa* Schw. non Röhling): III on 6 BC [1198; cf. 15, p. 203].
- P. dioicae* P.Magn. (*Dicaeoma hieraciatum* Arth., *P. extensicola* Plowr. var. *hieraciata* Arth., *P. hieraciata* Arth.): 0 I on 2 BC [13, p. 367]; on 5 Que 32:102; on 11 Sask Man [93, p. 68].
- P. fraseri* Arth.: III on *H. sp.*, 9, 10 NS [1138]; on 10 Ont [828], Que NS [15, p. 271].
- P. hieracii* (Röhling) Mart.: 0 II III on *H. sp.* Que [8]; on *H. sp.* NS PEI, 5, 10 NS [1138]; on 1 Alta 34:102; on 2 Alaska [175]; on 5 Alta Ont Que, 10 Man NS [15, p. 271]; on 5, 10 Ont [828]; on 5 Que 33:113; on 5 Man, 11 Sask Man [93, p. 69]; on 12 Greenl [899]; on 14 Greenl [900].
- Ramularia macrospora* Fres.: on 15 Greenl [900].
- Trichometasphaeria gloeospora* (Berk. & Curt.) Holm: on 9 Que [53].
- Unguicularia diaphana* (Rehm) Höhn. (*Naevia d.* Rehm): on *H. sp.* Greenl [900].
- Aster yellows virus (*callistephus virus 1*): aster yellows, jaunisse de l'aster: on *H. sp.* NB 33:113; on 7 NB 41:88.

Hierochloë R.Br.

GRAMINEAE

Fragrant perennial grasses of cool and temperate regions.

1. *H. alpina* (Sw.) Roem. & Schultes (*Aira a.* Liljebl. non L.); Greenl to Alaska, Nfdl, Que and BC.
2. *H. odorata* (L.) Beauv. (*Torresia o.* (L.) Hitchc.), sweet grass, foin d'odeur; Labr, Nfld and NS to BC; also in Eurasia.
3. *H. pauciflora* R.Br.; an arctic circumpolar species.

Ascochyta sorghi Sacc. (*A. graminicola* Sacc.): on 2 Sask [1034], Sask Man [93, p. 131].

Cladosporium graminum Cda.: on 1 Greenl [601], Frank [903].

- Claviceps purpurea* (Fr.) Tul.: on 2 Nfld 51:40.
- Colletotrichum graminicola* (Ces.) G.W.Wils.: on 2 Que [1041].
- Diplodia simmonsii* Rostr.: on 1 Greenl [601].
- Hendersonia crastophila* Sacc.: on 1 Alaska [1037].
- Leptosphaeria eustoma* (Fckl.) Sacc.: on 1 Frank [52].
- L. hierochloae* Oud.: on 1 Greenl [601]; on 3 Frank [604].
- L. microscopica* Karst. and *L. personata* Niessl.: on 1 Greenl [603].
- Lophodermium arundinaceum* (Schrad. ex Fr.) Chev.: on 1 Greenl [602, 899, 901].
- Mycosphaerella* sp.: on 1 Alaska [1038].
- M. ?ignobilis* (Auersw.) Syd. (*Sphaerella i.* Auersw.): on 2 Sask [93, p. 53].
- M. tassiana* (de Not.) Johans. (*Sphaerella t.* de Not.): on *H. spp.* BC [50]; on 1 Greenl [899]; on 1 Nfld, 3 Alaska [604]; on 3 Alaska [175].
- Ophiobolus graminis* Sacc.: on 2 Sask 25:6, [93, p. 55].
- Platyspora pentamera* (Karst.) Wehm. (*Clathrospora p.* (Karst.) Berl., *Pleospora p.* Karst.): on 1 Frank [604], Greenl [601, 603, 901].
- Pleospora heleocharidis* Karst. var. *arctica* (Karst.) Wehm. (*P. karstenii* Berl. & Vogl.): on 3 Alaska [175, 604, 1037].
- Pleospora herbarum* (Fr.) Rabh.: on 1 Greenl [899].
- P. vagans* Niessl.: on 1 Nfld [604].
- Puccinia graminis* Pers.: II III on 2 Sask Man [93, p. 88], Sask 31:125.
- P. praegracilis* Arth. var. *cabotiana* Savile: II III on 2 NS [956, p. 200].
- Pyrenopeziza stictoides* Sacc.: on 1, 2 Alaska [175].
- Pyrenophora macrospora* (Schroet.) Wehm. (*Pleospora m.* Schroet.): on 1 Que [604], Greenl [899]; on 3 Frank [600].
- P. trichostoma* (Fr.) Fckl. (*Pleospora t.* (Fr.) Ces. & de Not.): on 1 Alaska [175, 1037, 1038].
- Rhizoctonia solani* Kühn: on 2 Alaska [1037].
- Selenophoma donacis* (Pass.) Sprague & Johnson var. *stomaticola* (Bäuml., Sprague & Johnson): on 2 Alaska [1042].
- Trochila diminuens* Karst. (*Naevia d.* (Karst.) Rehm.): on 1 Greenl [601, 603]; see *Carex*.

Hippophae L.

ELAEAGNACEAE

Deciduous shrubs or small trees of Europe and w. and central Asia.

1. *H. rhamnoides* L., sea buckthorn, argousier; Europe to central Asia.

?*Agrobacterium tumefaciens* (Sm. & Towns.) Conn: crown gall, tumeur du collet: on imported 1 PEI 56:122.

Puccinia ?coronata Cda.: 0 on 1 Man 43:96.

Hippuris L.

HIPPURIDACEAE

Flaccid or fleshy plants of cool regions of the northern and southern hemispheres.

1. *H. vulgaris* L., mare's tail, pin d'eau; Greenl, Nfld, NS to Alaska.

Physoderma hippuridis Rostr.: on 1 Greenl [601; 900, p. 631]; on 1 var. *maritima* Greenl [901].

Holcus L.

GRAMINEAE

Perennial grasses native to Europe and Africa.

1. *H. lanatus* L., velvet grass, houque; Nfld to Ont and BC; naturalized from Europe.

Dilophospora alopecuri (Fr.) Fr.: twist, torsion: on 1 BC 36:20, 45:42, [1034].

Entyloma dactylidis (Pass.) Cif. (*E. crastophilum* Sacc.): leaf smut, charbon des feuilles: on 1 BC 50:46, [535].

Epichloë typhina (Pers.) Tul.: on 1-BC [50].

Helminthosporium triseptum Drechs.: on 1 BC 57:24; its present position in *Helminthosporium* is untenable, [cf. 992].

Puccinia coronata Cda.: crown rust, rouille couronnée: II III on 1 BC 50:46, NS 52:41.

P. recondita Rob. ex Desm. (*P. rubigo-vera* Wint.): II III on 1 BC [15, p. 178; 1203].

Ustilago salvei Berk. & Br. (*U. striiformis* (West.) Niessl): stripe smut, charbon en stries: on 1 BC [535].

Holodiscus Maxim.

ROSACEAE

Deciduous flowering shrubs of w. N. America and into S. America; one sometimes cult. for ornament.

1. *H. discolor* (Pursh) Maxim. (*Spiraea d. Pursh*), ocean spray; BC, Idaho, Mont and Calif.

Cylindrosporium spiraeicola Ell. & Ev.: leaf spot, tache cylindrosporiennne: on 1 BC 50:131, [535].

Hymenochaete rubiginosa (Dicks. ex Fr.) Lév. and *H. tabacina* (Sow. ex Fr.) Lév.: on 1 BC [1198].

Peniophora cinerea (Fr.) Cke.: on 1 BC [1198].

Phyllactinea guttata (Fr.) Lév. (*P. corylea* (Pers.) Karst.): powdery mildew, blanc: on 1 BC 33:123, [535].

Poria ferrea (Pers.) Bourd. & Galz.: on 1 BC [1198].

Trametes mollis (Sommerf.) Fr.: on 1 BC [1198].

Tulasnella violacea (Qué.) Bourd. & Galz.: on 1 BC [1198].

Hordeum L.

GRAMINEAE

Cespitose annual or perennial grasses of N. and S. America, Eurasia and n. Africa.

1. *H. brachyantherum* Nevski [*H. jubatum* L. ssp. *breviaristatum* Bowden], (*H. nodosum* auct.); Labr, Nfld, and Alta to Alaska.
2. *H. jubatum* L., wild barley or squirreltail grass, queue d'écureuil; Labr, Nfld and NS to Alaska. This weedy grass is most abundant in W. Canada. 2a, *H. j.* var. *caespitosum* (Scribn.) Hitchc. (*H. c.* Scribn.) [*H. j.* ssp. \times *intermedium* Bowden]; Alaska to ND.
3. *H. vulgare* L., barley, orge; a widely grown cereal used for feed and in the making of malt. There are two major groups of cultivars,

the 2-rowed form, *H. distichon* L., and the 6-rowed form, *H. hexastichon* L.

Other hosts: 4, *H. brevisubulatum* (Trin.) Lk. 5, *H. murinum* L.

Absidia orchidis (Vuill.) Hagem. and *A. glauca* Hagem.; rare in Canada on cereal seed, mostly of 3 [633].

Acremoniella atra (Cda.) Sacc.: from 3 Man [93, p. 112].

Alternaria tenuis auct. sensu Wiltshire: from discolored kernels of 3 Sask 40:14, and from clean-looking samples; very common on cereal seeds in Canada [633], Ont [374]; on plants Que 55:11; frequent from blighted heads along with *Bipolaris sorokiniana* and *Fusarium* spp. (q.v.).

Ascochyta hordei Hara: on 1 Alaska [1042].

A. sorghi Sacc. (*A. graminicola* Sacc.): on 1 Alaska [175, 1034, 1037].

Aureobasidium pullulans (de Bary) Arn. (*Pullularia p.* (de Bary) Berk.): relatively abundant on seed of 3 in Canada [633].

Low-temperature basidiomycete: suspected on 1 Alaska [1042].

Belonioscypha campanula (Fr.) Rehm: on *H.* sp. Alaska [176]; on 1 Alaska [1038].

Bipolaris sorokiniana (Sacc. in Sorok.) Shoem. (*Helminthosporium sativum* Pamm., King & Bakke): spot blotch, helminthosporiose: on 2 Man [93, p. 120]; on 3 BC-Nfld 21:15, 31:19, 33:11, 37:12, 39:21, 58:5. The fungus attacks all parts of the plant, but the spot blotch phase is common on and destructive to the foliage, and lesions also occur to some extent on the nodes and spikelets; frequent from seed of 3 in Canada [633].

B. sorokiniana and *Fusarium* spp. (q.v.): head blight, brûlure des épis: trace to slight infections are common on 3 BC to PEI, particularly in moist seasons. In some fields *B. sorokiniana* may be dominant; in others, *Fusarium*, 37:13.

B. sorokiniana and *Fusarium* spp.: common root rot, pourriture commune des racines: regularly recorded from Alta, Sask and Man and probably rather abundant in the other provinces, but usually reported only when the disease is severe, 30:23, 31:20, 32:21, 41:13. In general the disease is more severe in the seedling stage as the result of sowing infested seed Man 42:13, Ont 37:12, Que 50:12.

The etiology of the disease, particularly the seedling phases, has been described and illustrated [718]. As a result of infection of the developing seed by air-borne spores, the most severely infected samples of barley were from Man and NB. Seedling injury was greatest under conditions unfavorable to the host, i.e., high temperature and excessive moisture or low temperature and scant moisture, whereas maximum recovery from attack occurred under cool conditions (15-18 C) and in moist, well-aerated soil [719].

In artificially infested soils, disease development in seedlings was shown to be influenced by toxic substances produced by *B. sorokiniana* in liquid media [622]. Production of toxic substances reaches a fixed level and continues for some time. The toxins are relatively nonspecific and appear to condition susceptible hosts to invasion by the fungus. Pathogenicity is only partially correlated with toxin production [621]. The toxin is reported to be a modified sesquiterpenoid, with the empirical formula $C_{15}H_{22}O_2$ [675, 676].

Susceptibility of barley coleoptiles to the organism is associated with senescence. Aqueous

Hordeum

extracts of young coleoptiles show high antifungal activity, which disappears with age owing to the appearance of an inhibitor. The chemical nature of the factor and its inhibitor has been partly investigated [624].

Bipolaris tetramera (McKinney) Shoem. (*Helminthosporium t.* McKinney): from seed of cereals in Canada [633].

Brachycolus tritici Gill.: western wheat aphid: associated with the so-called disease of brittle dwarf on 3 Sask 32:21, 46:6.

Camarosporium umbonatum Brenckle: from cereal seed from Sask [633].

Candida variabilis (Lind) Berk.: on seed of barley and oats Alta Sask Man [633].

Chaetomium spp.: *C. elatum* Kze. & Schm. was common on moldy heads and *C. funicola* Cke. on dead seedlings of 3 Man [93, p. 47].

Cladosporium cladosporioides (Fres.) De Vries: on 5 Que 55:11; from seed in Canada [633].

C. herbarum Lk.: on 1 Alaska [1038].

Claviceps purpurea (Fr.) Tul. (stat. conid. *Sphacelia segatum* Lév.): ergot, ergot: on 1 Alaska [175, 1037, 1038]; on 2 Yukon [1042], Man 34:102, [93, p. 45]; on 3 Yukon 43:11, and all provinces except Nfld 24:13, 25:14, 28:22, 30:24, 37:13. Traces of ergot are not uncommon on 3 and occasionally the level of infection may be serious, as in smooth-awned varieties in Ont, 37:13, 40:14, 45:13; indeed, in the epidemic years 1941-42 in Sask, ergot in feed barley was implicated in the death of suckling pigs, 42:13. A 4-year survey 1953-56 of cereal crops in Alta Sask Man demonstrated that barley and wheat were much less susceptible to ergot than rye, 56:26; infected volunteer rye may be an important source of ergots in the threshed grain, 53:26. Development of the infection in the barley ovary was described [173].

Colletotrichum graminicola (Ces.) G.W.Wils.: anthracnose, anthracnose: on 3 Que 61:46; *C. sp.* rare on seed from Alta Sask Man [633].

Constantinella sp.: from seed of 3 in Canada [633].

Cryptosporus graminis Robinson & Ayers: on roots of 3 PEI [890].

Curvularia geniculata (Tracy & Earle) Boed. (*Helminthosporium geniculatum* Tracy & Earle): on crowns of 3 Man [93, p. 120].

C. geniculata and *C. spicifera* (Bain.) Boed. (*Helminthosporium spiciferum* (Bain.) Nicot): common on cereal seed in Canada [633]; the latter species is not a typical *Curvularia* and was considered by Sprague [1034, p. 389] to be close to *Bipolaris tetramera* (q.v.).

Dilophospora alopecuri (Fr.) Fr. (*D. graminis* Desm.): twist, torsion: on 3 Sask 24:14, [93, p. 33].

Drechslera graminea (Rabh. ex Schlecht.) Shoem. (*Helminthosporium gramineum* Rabh. ex Schlecht., stat. perf. *Pyrenophora graminea* Ito & Kurib.): stripe, stria: unlike net blotch, stripe is not common and rarely causes severe infections; recorded on 3 Alaska [175, 1037], BC [535], represented by specimens from Alta to Que and again in NS 36:11, [993; 1138]; on seed of 3 in Canada [633]. In studies on stripe, Trebi proved highly resistant and Glabron moderately so; progeny of reciprocal crosses showed no transgressive reaction for greater resistance [531]. Other studies were on the influence of amino acids on the growth of two strains of the organism that differed markedly in pathogenicity on certain barleys [1013]; and on the histological changes that occur when susceptible and resistant cultivars of 3 are inoculated with mycelium of the fungus [1012].

D. teres (Sacc.) Shoem. (*Helminthosporium t.* Sacc., stat. perf. *Pyrenophora teres*, q.v.): net blotch, rayure réticulée: on 1 Alaska [1037, 1038]; on 3 BC-PEI 24:13, 27:23, 29:17, 32:20, 35:12, 36:12, [cf. 479, p. 635; 993]; probably the most important disease of barley in Canada and in some seasons it lowers yields by destroying the leaves. Primary infection may arise from mycelium in infected seed, which is slowly freed from infection by the death of the mycelium [638]. Infection was prevalent in seed collected 1938-41 from various parts of Canada, ranging up to 64 percent; a plating test of the seed is necessary to detect the fungus [637].

D. tritici-repentis (Died.) Shoem.: on 3 Ont [933].

Epicoccum nigrum Lk. (*E. purpurascens* Ehrenb.): frequent on cereal seeds in Canada [633].

Erysiphe graminis DC. ex Mérat: powdery mildew, blanc: on 1 Alaska [175, 1037]; on 2 Yukon [1042], Alta 29:76, 50:46, Mack 40:100, Sask Man [93, p. 44]; on 3 BC-PEI 23:24, 30:24, 33:12, 34:16, 38:16, 40:14, 42:12, most prevalent in coastal BC, Ont, 43:12, and s.w. Que, 45:13. Brant, a cultivar developed at Ont. Agr. Coll., is resistant to powdery mildew, 54:11. Conidia germinate at low humidity [131]. The protoplasm in the mycelium and conidiophores is continuous from cell to cell [130].

E. graminis f. sp. *hordei* Marchall: overwinters as mycelial mats on dead straw and as mycelial infections on overwintering hosts [182]. Nine physiologic races were identified in collections made from BC to Que and among the 246 cultivars of 3, etc., tested a number were resistant to all nine races [768]. Some reduction in air pressure stimulated germination of conidia [134].

Fusarium spp.: on 1: *F. acuminatum* Ell. & Ev., *F. avenaceum* (Fr.) Sacc., *F. equiseti* (Cda.) Sacc., Alaska [1038]; also *F. nivale* (Fr.) Ces., Alaska [1037].

From 2: *F. equiseti*, *F. oxysporum* Schlecht., Alta [335]. On 2: *F. nivale*, Alaska [1042].

From seed of 3: *F. acuminatum* (*F. scirpi* Lamb. & Fautr. var. *a.* (Ell. & Ev.) Wr.), *F. avenaceum*, *F. culmorum* (W.G.Sm.) Sacc., *F. equiseti*, *F. graminearum* Schwabe, *F. moniliforme* Sheld., *F. oxysporum*, *F. poae* (Pk.) Wr., *F. sambucinum* Fckl. var. *coeruleum* Wr. (*F. s. f.* 1 Wr.), *F. scirpi*, *F. semitectum* Berk. & Rav. var. *majus* Wr., *F. sporotrichoides* Sherb., Man [332]; also *F. oxysporum* var. *redolens* (Wr.) Gordon, *F. solani* (Mart.) App. & Wr. in Canada [333].

From blighted heads of 3: *F. acuminatum*, Sask Man 56:8, Que 49:9; *F. avenaceum*, Que 49:9, NB NS 37:13, *F. gramineum*, Que 49:9; *F. poae*, BC PEI 38:15, Man [335]; *F. sambucinum* var. *coeruleum*, Que 49:9; *F. sporotrichoides*, Sask [335].

From leaves of 3: *F. oxysporum*, Sask [335].

From diseased basal parts of 3: *F. acuminatum*, *F. avenaceum*, *F. equiseti*, *F. sambucinum*, *F. solani*, Man; *F. culmorum*, *F. oxysporum*, *F. o.* var. *coeruleum*, *F. poae*, BC Man [335].

Gelasinospora tetrasperma Dowding: from seed of 3 Man [633].

Heterosporium avenae Oud.: on 2 Yukon [1042]; on 3 affected by barley stripe mosaic (q.v.) Man 29:18, [93, p. 120; 1034].

H. hordei Bubák: on *H. sp.* Alaska [175, 1037].

Hormodendron hordei Bruhne: on 3 Alta 29:18.

Lagenia radicola Vanterpool & Ledingham: on rootlets of 3 Sask Ont [93, p. 29; 1034].

Leptosphaeria avenaria Weber f. sp. *triticea* T.Johnson (stat. conid. *Septoria avenae* Frank f. sp. *triticea*

- T.Johnson): on 2, 3 Que 53:12; on 3 Alta-PEI [504], Sask Man [1034]; on seed of 3 in W. Canada [633].
- Lophodermium arundinacearum* (Schröd. ex Fr.) Chev.: on 1 Alaska [1038].
- Monilia sitophila* Mont.: on seed of 3 Ont [633].
- Mycosphaerella tulasnei* (Jancz.) Lindau: on 1 Alaska [1038].
- Nigrospora sphaerica* (Sacc.) Mason: on seed of 3 especially in Man [633].
- Olpidium brassicae* (Wor.) Dang. (*Asterocystis radialis* de Wild.): on 3 Sask 29:11, [1034].
- Ophiobolus graminis* Sacc. (*O. cariceti* (Berk. & Br.) Sacc.): take-all, piétin-échaudage: on 3 BC 54:12, Alta 34:15, Sask Man [93, p. 55]. Russell [905, 906] studied the disease as it occurs in Sask mainly in the parkland area; occasionally destructive on the second crop of wheat from breaking of sod.
- Paecilomyces varioti* Bain.: on cereal seed in W. Canada [633].
- Passalora graminis* (Fckl.) Höhn. (*Scolecotrichum g.* Fckl.): brown stripe, strie brune: on 1 Alta, 3 Sask [1034]; on 1, 2, 3 Alaska [175, 1037]; on 2 Yukon [1042]; on 2 Sask Man, 3 Sask [93, p. 126].
- Penicillium* spp.: usually present on a low percentage of cereal seeds particularly of 3 in Canada [633]; consult paper for species listed.
- Phaeoseptoria festucae* Sprague: on 1 Alaska [1037, 1038].
- Phoma* spp.: occur in trace amounts on cereal seeds in Canada; *P. glomerata* (Cda.) Wr. & Hockl., was the most common of the three species recognized but otherwise unnamed [633].
- Pleospora trichostoma* (Fr.) Ces. & de Not.: recorded on 3 BC [50] for *Drechslera teres* (q.v.).
- Polymyxa graminis* Ledingham: on 3 Ont [1034].
- Pseudomonas* sp. inedit.: caused a brown streak of 3 Man 52:11, 53:11.
- P. atrofaciens* (McCull.) F.L.Stev.: basal glume rot, bactériose des glumes: on 3 Man 38:16, [93, p. 28].
- Puccinia coronata* Cda.: crown rust, rouille couronnée: II III on 2 Alta 55:51.
- P. coronata* f. sp. *secalis* Peturson: 2 and cultivars of 3 are moderately to highly susceptible to this form [845]; although undetected in the field on 3 it probably is present in Ont near *Rhamnus cathartica* (q.v.).
- P. graminis* Pers.: stem rust, rouille de la tige: II III on 2 Alta 22:22, 53:52, Sask Man [93, p. 68], PEI 25:1, 51:40; on 2, 3, Alta Man [15, p. 175]; on 4 cult. Man 43:39; on 5 cult. Man [93]; on 3 BC-PEI 20:1, 21:12, 25:13, 26:6, 28:20. In years when stem rust is epidemic on wheat in s. Man and s.e. Sask, rust is prevalent on barley, especially in late fields, Man 30:19, 40:16. Heavy infections also occur near barberries NS 37:11. A 25% infection, formerly considered of little significance, reduced yields and the percentage of heavy-grade kernels by 15% and quality by one grade Man 41:14, [cf. 847].
- The existence of races of *P. graminis* f. sp. *tritici* more pathogenic to 3 with Peatland type of resistance than those prevailing in W. Canada has been demonstrated. Moreover, resistance to races of *P. graminis* f. sp. *secalis*, which is present in E. Canada, is rare in cultivars of barley [508]; of 270 cultivars, only Black Hulless C.I. 666 was resistant to the latter form [524].
- P. graminis* f. sp. *secalis* Erikss. & Henn.: II III on 3 Man 44:ii, Ont 52:16, NB NS 51:14.
- P. hordei* Otth (*P. anomala* Rostr., *P. simplex* Erikss. & Henn.): dwarf leaf rust, rouille naine des feuilles: on 2 (doubtful) Alta 56:46; on 3 to some extent from BC to PEI 20:1 et seq.; most prevalent during cool seasons and most abundant in BC NB NS PEI [778], Man Ont [15, p. 176]. Marked reduction in yield was attributed to this rust BC 38:14. The rust adversely affected yield, bushel weight, kernel weight and malting quality of most cultivars, but cultivar response was significantly different [778].
- P. montanensis* Ell.: II III on 2 Alta [15, p. 151; 93, p. 70].
- P. pygmaea* Erikss.: recorded on 1 Alaska [175, 1037], but host or rust probably misdetermined.
- P. recondita* Rob. ex Desm. (*P. rubigo-vera* Wint.): II III on 2 Alta 34:102, Sask 24:59, Man [93, p. 71; 15, p. 180, 182].
- P. striiformis* West. (*P. glumarum* (Schmidt) Erikss. & Henn.): stripe rust, rouille striée: II III on 2 BC 31:4, Alta 24:12, Sask 32:3; on 2a BC 31:4; on 3 BC 30:20, Alta 24:12. Common on 2 in Alta, but infections on 3 rarely exceed a trace to slight; the cultivar OAC 21 is very susceptible [938; cf. 770].
- Pyrenophora teres* (Died.) Drechs.: on overwintered straw of 3 Alta Que 40:15. McDonald [684] demonstrated that the fungus is bisexual, hermaphroditic and self-sterile.
- Pythium* spp.: detected on seed of 3 Man [633].
- P. debaryanum* Hesse: on 3 Sask Man [1034].
- P. graminicola* Subram. (*P. arrhenomanes* Drechs. var. *canadensis* Vanterpool & Truscott) and *P. spp.*: browning root rot, piétin brun: on 3 Alta 56:9, Sask 26:7, 29:10, Man 28:15, [cf. 93, p. 31]; oospores in the roots of 2 Sask 33:20, 34:7, [cf. 1034].
- P. volutum* Vanterpool & Truscott: pathogenic to 3 Sask [93].
- Ramularia pusilla* Unger (*Ovularia p.* (Ung.) Sacc.): on 1 Alaska [1037, 1038]; on 2 Yukon [1042].
- Rhizoctonia solani* Kühn: on 1 Alaska [1042].
- Rhizopus arrhizus* Fischer, *R. elegans* Eidam, *R. nigricans* Ehr. and *R. tritici* Saito: common on seed of 3 in Canada [633].
- R. kasanensis* Hanzawa: from seed of 3 Ont [374].
- Rhynchosporium orthosporum* Caldwell: on 1 Alaska [1042].
- R. secalis* (Oud.) Davis: scald, tache pâle: on 1 Alaska [1042]; on 2 Alta 56:46, Sask [93, p. 126]; on 3 BC 31:20, Alta 22:17, Sask 23:23, Ont 49:10, Que 54:12, [cf. 1034]. Because the fungus is favored by cool temperatures, the disease is commonly severe in central and n. Alta 56:9, and in n. Sask 50:13. The fungus overwinters predominantly as dormant mycelium on crop debris of 3, but it is also seed-borne [1011].
- Sclerotium delphinii* Welch: occasionally on seed of 3 Man [633].
- Selenophoma donacis* (Pass.) Sprague & Johnson var. *stomaticola* (Bäuml.) Sprague & Johnson: eye spot, tache ocellée: on 1 Alaska [1042]; on 3 Sask 43:13, S. sp. on 2 Alta 56:46.
- Septogloeum oxysporum* Sacc., Bomm. & Rouss.: on 1 Alaska [1037, 1038].
- Septoria nodorum* Berk.: on 1 Alaska [1037, 1038, 1042]; on 1 Alta, 2 Alta Man, 3 Man [1034]; on 3 Man 43:13; but compare with *Leptosphaeria avenaria* f. sp. *triticea*.
- S. passerinii* Sacc.: speckled leaf blotch, tache septorienne: on 1 Alaska [1037, 1038, 1042]; on 2 Alta 34:102, Man [93, p. 139]; on 3 BC-Que [1034],

Hordeum

Sask Man [93], Alta-Que 23:23, 36:113, 40:16. From 1945 the disease became increasingly prevalent in Man and tended to appear each year in certain localities in Sask to Que 48:11; heavy in Man in 1950, 1951 [355] and 1955, 55:13. The organism that occurs widely on 2 is pathogenically distinct from that on 3. Histological changes induced by the pathogen were described and sources of resistance noted; all cultivars of the Manchurian type were susceptible [355]. When the crop was artificially inoculated, yield was reduced in 2 out of 5 years and malting quality adversely affected by 20% [354].

Sordaria fimicola (Rob.) Ces. & de Not.: on seed of 3 in Canada [633].

Stemphylium botryosum Wallr.: on cereal seed, especially in W. Canada [633].

Torula antennata Pers.: on cereal seed, especially in W. Canada [633].

Urocystis agropyri (Preuss) Schroet.: on 1 BC [292]; on 2 Alta 59:42.

Uromyces mysticus Arth. (*U. jacksonii* Arth. & Fromme): on 1 Alaska [1042].

Ustilago bullata Berk. (*U. lorentziana* Thüm.): on 2 Alaska [175, 1037], Yukon [953], Mack 40:101, 47:38, BC 30:96, 50:47, Alta 24:59, Sask Man [93, p. 62], and also Ont Que [292].

U. hordei (Pers.) Lagerh.: covered smut, charbon couvert: on 3 Alaska [175, 1037], BC to PEI 20:2, 25:12, 26:5, 34:11, wherever barley is grown [cf. 292]. The level of infection varies with the season; the average infection rarely exceeds 1%, although individual fields often show 10 to 15% of the heads affected and infections of 65 to 70% have been recorded Alta 31:18, Sask 42:14.

The heritable nature of smut resistance was demonstrated by crosses between a highly resistant and a moderately resistant cultivar [530]; two physiologic races were distinguished by their reaction on Eureka Hulless barley (37% vs. zero) [5]. Cultures of the smut, although more variable than *U. kolleri* on *Avena*, yielded some stable strains from field collections or after limited purification [183].

U. nigra Tapke (*U. medians* Biedenkopf, *U. avenae* sensu lat.): seedling-infecting or black loose smut, faux charbon nu: on 3 Man 35:11, 42:15, Alta Sask Man Ont [292], Que, where it was present in about 40% of the collections tested, 43:14. In the Prairie Provinces, *U. nigra* was relatively prevalent in Man compared with *U. nuda*, whereas the reverse was true in Alta 44:13. Strains of this smut are the most variable of the seedling-infecting smuts of oats and barley [183].

U. nuda (Jens.) Rostr.: true loose smut, charbon nu: on 3 Alaska [1037], BC-PEI 24:12, 25:12, Mack 40:101, [cf. 292]. Undoubtedly most prevalent in the moister parts of Canada and sporadically heavy, as in the Ottawa Valley, Ont 37:12, after a season favorable for infection.

It was experimentally demonstrated that for every 1% increase in smut, yield of barley was reduced by about the same figure [981].

The whole embryo method proposed by Simmonds [1000] and further developed by Russell [908] has proved a useful tool in estimating the potential infection in the subsequent crop and in this way seed stocks that are carrying undesirable levels of loose smut may be eliminated. Also sequential sampling may be reliably used to speed examination [910].

Dominant genes for resistance were detected in Titan and Jet, including one in Jet against a new race, T₂, of smut; resistance was determined by the

genetic constitution of the embryo rather than the surrounding floral structures [1014]. No stable cultures of *U. nuda* have been isolated [183].

The hot water treatment has long been recommended for the control of loose smut [392] and although Russell [907] proposed certain modifications to improve its effectiveness, it requires apparatus available on few farms. Both Tyner and Russell [911, 1094, 1095, 1097] sought a simpler method of controlling loose smut. They [911] found that control may be achieved by soaking the seed in water under suitable combinations of temperature and time from 66 F for 80 hours to 86 F for 35 hours. Nevertheless, germination of the treated seed was often adversely affected. To overcome this defect, Russell and Chinn [186, 909] recommended soaking the seed in a 1 or 2% common-salt solution.

Xanthomonas translucens (Jones, Johns. & Reddy) Dowson sensu lat. (*Bacterium* t. J., J. & R.) and *X. translucens* f. sp. *hordei* Hagborg [396, p. 317]: bacterial blight, brûlure bactérienne: on 1 Alaska [1042]; on 3 Alta 31:19, Sask 30:22, Man 20:4, 24:14, Que 33:12, NB 60:95; ? from seed of 3 Alta 38:10. Cultivar resistance evident Alta 50:14; regional and seasonal differences noted, 53:13.

Phages specific to *X. translucens* ff. spp. *hordei*, *secalis* (Sm., Jones & Reddy) Hagborg and *hordei-avenae* were isolated from barley and oat seed; attempts to isolate phages specific for ff. spp. *cerealis* and *undulosa* were unsuccessful [1066].

X. translucens f. sp. *cerealis* Hagborg and f. sp. *undulosa* (Sm., Jones & Reddy) Hagborg: infected seedlings of *H. spp.* upon wound inoculation [396].

X. translucens f. sp. *hordei-avenae* Hagborg: on 3 in plots Man 42:15, 43:14.

X. translucens f. sp. *undulosa*: once isolated from 3 Man 34:4.

Barley stripe mosaic virus: false stripe, strie virale: first recorded on 3 in Man 24:13; also BC 41:15, Alta 32:20, 53:13, Sask 29:18, Ont PEI 30:22, Ont 58:7. The virus nature of the disease was confirmed, 51:10, [397]. Yields were reduced by artificial inoculation of the crop and its transmission through the seed fully established, 52:12. Heavy infections are rarely seen in farmers' fields. Whole milk or whey added to the virus inoculum or sprayed on the plants before inoculation strongly inhibited infection [398].

Barley yellow dwarf virus: yellow dwarf, nanisme jaune: on 3 Alta 54:14, 55:14, Man 60:63, Ont 57:9, Que 59:7, NB 60:95, PEI 61:48; marked reduction of yield was obtained experimentally at Ottawa 58:17. It was experimentally transmitted from 3 collected in Alta Sask Man Ont Que and NB by one or more of the aphids *Rhopalosiphum padi* (L.), *Macrosiphum avenae* (Fab.) and *Rhopalosiphum maidis* (Fitch) [1030]. Winter wheat, fall barley and rye, where present, and perennial grasses are the overwintering hosts of the virus [cf. 804]; see also under *Avena*.

Wheat streak mosaic virus, streak mosaic, mosaïque-bigarrure: on 3 Alta 53:13, 54:14.

Manganese deficiency, carence de manganèse: leaf-tip yellowing, jaunissure apicale des feuilles: on 3 Sask 51:11, 53:13.

Nitrogen deficiency, carence d'azote: leaf yellowing, pâleur: on 3 PEI 51:11.

Phosphorus deficiency, carence de phosphore: on 3 Sask 59:7.

Temperature extremes: extrême de température: chlorotic banding, étranglement chlorotique: (a), as a result of high surface-soil temperature: on 3 Sask 50:15, 59:7, [cf. 1112]; (b), frost at emergence: on 3 Alta 35:13.

Hosta Tratt. (*Funkia* Spreng.)

LILIACEAE

Plants of China and Japan, commonly planted for both their ornamental foliage and bloom.

Botrytis cinerea Pers.: on *H. sp.* Alaska [175].

Houstonia L.

RUBIACEAE

Small herbs of N. America.

1. *H. caerulea* L., bluets, houstonie bleue; NS and NB to s. Ont.
2. *H. longifolia* Gaertn.; Que to Sask.

Uromyces houstoniatus Sheldon: 0 I on 1 Que 33:113, NS [1138]; on 2 Sask 32:102, [15, p. 228; 93, p. 72].

Howea Becc.

PALMACEAE

Two erect feather palms from an island in the s. Pacific Ocean, extensively grown by florists for decoration under the name *Kentia*.

Colletotrichum kentiae Halst. [*C. gloeosporioides* Penz.]: on *H. sp.* in greenhouse Alaska [175].

Humulus L.

CANNABINACEAE

Twining perennials of the northern hemisphere.

1. *H. lupulus* L., common hop, houblon; native to NB and Que; also introduced from Europe and long cult. and also naturalized.

Agrobacterium tumefaciens (Sm. & Towns.) Conn: crown gall, tumeur du collet: on 1 BC 32:40.

Colletotrichum humuli Dearn. [*C. gloeosporioides* Penz.]: on living leaves of 1 Man [93, p. 129].

Diplodia humuli Fckl.: on dead stems of 1 Man [93, p. 133].

Fumago vagans Pers.: sooty mold, moisissure charbonneuse: on cones of 1 BC [535].

Fusarium solani (Mart.) App. & Wr.: from roots of imported plants of 1 Man [335].

Phyllosticta humuli Sacc. & Speg.: on 1 Man 24:79.

Phytophthora cactorum (Lib. & Cohn) Schroet. var. *applanata* Chester: black rot, pourriture noire: on 1 BC 55:63.

Pseudoperonospora humuli (Miy. & Tak.) Wilson: downy mildew, mildiou: on 1 BC 31:40, 48:43, Man Ont [93, p. 31], Man 44:46, Ont 36:25, 47:50, Que 41:35. A disease of economic importance wherever hops are grown commercially; in BC the Fuggles cultivar was highly resistant, 45:54. Bordeaux or fixed copper, preferably applied as a spray, controlled the disease, 33:26, 50:56, recently zineb has been used, 56:44.

Rhizoctonia solani Kühn: on young shoots of 1 BC 50:57.

Sphaerotheca macularis (Wallr. ex Fr.) Magn. (*S. humuli* (DC.) Burr.): powdery mildew, blanc: on 1 Man [93, p. 44], Ont 36:25, 47:50, Que 41:35.

Verticillium dahliae Kleb.: wilt, flétrissure verticillienne: on 1 BC 53:60, 55:63.

?Hop mosaic virus: mosaic, mosaïque: on 1 BC 32:34, 33:26, Ont 36:25. Although described in BC as chlorosis and attributed to humulus virus 3 Salmon & Ware by Jones [535], the limited recorded occurrence of the latter virus throws doubt on its presence there.

Hop nettlehead virus: nettle head, tête d'ortie: on 1 BC 32:40, 47:50.

Hyacinthus L.

LILIACEAE

Bulbous scapose plants of the Mediterranean region, tropical and s. Africa.

1. *H. orientalis* L., common hyacinth, jacinthe; Greece to Syria and Asia Minor.

Alternaria sp.: associated with a leaf spot of 1 BC 58:116.

Ditylenchus dipsaci (Kühn) Filip.: bulb nematode, anneau brun nématique: on 1 BC 44:110; the hot water treatment of the bulbs has greatly reduced the incidence of the nematode.

Erwinia carotovora (L.R.Jones) Holland: soft rot, pourriture molle: on 1 BC 57:126, Alta 53:118, Ont 48:109, PEI 52:115.

Fusarium oxysporum Schlecht.: from decayed bulbs or blighted flowers of 1 Man [335].

Sclerotium sp.: associated with a wilt of 1 BC 58:116.

Uromyces muscari (Duby) Lév. f. sp. *hyacinthi* (Lehocksky) Savile (*U. scillarum* (Grev. ex Berk.) Lév.): III on 1 BC [963; cf. 15, p. 225].

Xanthomonas hyacinthi (Wakk.) Dowson: yellows, jaunisse bactérienne: on 1 BC 47:110, 49:106, Ont 25:71, 47:110; a disease of some importance in growing certified bulbs in BC, although losses are usually not high, 56:128.

Hydrangea L.

SAXIFRAGACEAE

Woody plants, mainly erect shrubs, of N. and S. America; some highly prized ornamentals.

1. *H. arborescens* L., wild hydrangea; native to the e. half of the US; often cult.
2. *H. macrophylla* (Thunb.) DC.; Japan.
3. *H. paniculata* Sieb.; native to Japan and China; especially 3a, *H. p.* var. *grandiflora* Sieb., the peegee hydrangeas.

Ascochyta hydrangeae Arn.: on *H. sp.* Alaska [175].

Botrytis cinerea Pers.: gray mold, moisissure grise: on *H. sp.* Alaska [175]; on 3 Que 59:82.

?*Erysiphe cichoracearum* DC ex Méral (*E. communis* Wallr. ex Fr., *Oidium* sp.): powdery mildew, blanc: on 22 BC 37:77, Sask 31:95, Ont Que 47:110, NB 61:104; on 3a Que 52:115; damage severe where care is not taken in greenhouse to provide good aeration Ont 49:106, 57:126.

Mycosphaerella tassiana (de Not.) Johans.: on *H. sp.* BC [50].

Nectria cinnabarina Tode ex Fr.: on ?1 NS 36:77, [1138].

Phyllosticta hydrangeae Ell. & Ev.: leaf spot, tache foliaire: on *H. sp.* Man Que 52:115, Que 58:116, NS [1138].

Hydrangea

Sclerotinia sclerotiorum (Lib.) de Bary: cause of a stem rot of *H. sp.* from BC 49:106.

Oedema, œdème: attributed to excess water; on ?2 Que 52:115; on 3 Que 57:126.

Hydrocotyle L.

UMBELLIFERAE

Perennial herbs of temperate and warm regions.

1. *H. americana* L.; in Nfld and from NS to Ont.

Erysiphe polygoni DC. ex Méral: on *H. sp.* Que 33:113.

Hydrophyllum L.

HYDROPHYLLACEAE

Perennial herbs of N. America.

1. *H. capitatum* Dougl.; BC and Alta to Wash, Oregon and Colo.
2. *H. tenuipes* Heller; BC to Wash and Calif.
3. *H. virginianum* L., john's-cabbage, hydrophyll de Virginie; Que, Ont and Man, and south into the US.

Puccinia hydrophylli Pk. & Clint.: III on 3 Ont [828; cf. 15, p. 327].

P. recondita Rob. ex Desm. (*P. rubigo-vera* Wint.): 0 I on 2 BC [1198; cf. 15, p. 182].

Synchytrium sp.: on 1 BC [541].

Hydrosme Schott

ARACEAE

Coarse, foul-smelling herbs of tropical Africa and Asia; one cult. as an oddity.

1. *H. rivieri* (Dur.) Engler (*Amorphophallus r.* Dur.); native to Indo-China.

Botrytis cinerea Pers.: on *H. sp.* Alaska [175].

Hylocereus Britt. & Rose

CACTACEAE

Climbing cacti of the West Indies, Mexico and n. S. America.

1. *H. undatus* (Haw.) Britt. & Rose, the best known of the night-blooming cereuses; widely cult. in tropical countries.

Phyllosticta ?opuntiicola Bubák: stem rot, pourriture des tiges: on 1 Ont 43:108.

Hyoscyamus L.

SOLANACEAE

Erect or prostrate herbs of the Mediterranean region.

1. *H. niger* L., henbane, jusquiame; naturalized from Europe in NS, Que, Ont and Man; sometimes grown for the narcotic hyoscyamin.

Fusarium spp.: from seeds of 1: *F. oxysporum* Schlecht., *F. sambucinum* Fckl., Ont [334].

Hypericum L.

HYPERICACEAE

Herbs or shrubs of the northern hemisphere; grown in the open for their attractive flowers.

1. *H. ascyron* L.; Eurasia; cult.
2. *H. boreale* (Britt.) Bickn.; Nfld and NS to Ont.
3. *H. canadense* L.; Nfld to Man.
4. *H. ellipticum* Hook.; Nfld and NS to Man.
5. *H. kalmianum* L.; Que and Ont.
6. *H. mutilum* L., in the US; apparently represented in Canada by 6a, *H. m.* var. *parviflorum* (Willd.) Fern.; NS to Ont.
7. *H. perforatum* L., common St.-John's-wort, pertuisane; naturalized from Europe; in Canada from PEI to Ont and in BC.
8. *H. punctatum* Lam.; in Que and Ont.
9. *H. spathulatum* (Spach) Steud. (*H. prolificum* auct. Am.) broom brush; Ont.
10. *H. virginicum* L. (*Triadenum v.* (L.) Raf.), Saint-Peter's-wort, NS, or the more abundant 10a, *H. v.* var. *fraseri* (Spach) Fern.; Nfld, Labr and NS to Man.

Gloeosporium cladosporioides Ell. & Halst.: blight, brûlure: on 1 cult. Man, 10 Ont 44:110.

Uromyces sparganii Clint & Pk. ssp. *sparganii*: 0 I on 10 Ont Que [831; cf. 828].

U. triquetrus Cke. (*U. hyperici* Curt., *U. hyperici-frondosi* Arth.): rust, rouille: 0 I II III on *H. sp.* 2, 3, 4, 10 NS [1138]; on 5, 9 Ont, 10 Ont Que NS [15, p. 247]; also on *H. sp.* Que 33:113; on 2, 4, 6, 8 Ont [828].

Hystrix Moench

GRAMINEAE

Perennial grasses of N. America, Asia and New Zealand.

1. *H. patula* Moench [*Elymus hystrix* L.] [cf. 106, p. 586], bottle brush; in Canada from NS to Que and in Ont.

Phyllachora graminis (Pers. ex Fr.) Fckl.: on 1 Ont [805, 1034].

Puccinia recondita Rob. ex Desm. (*P. rubigo-vera* Wint.): II III on 1 Que; connected by Fraser with 0 I on *Actaea* (q.v.) [15, p. 180, 181].

Iberis L.

CRUCIFERAE

Annual or more or less woody perennial herbs of s. Europe, cult. for ornament.

1. *I. amara* L., rocket candytuft, herbeaux yeux; annual, native to s. Europe.
2. *I. umbellata* L., globe candytuft, gris de lin; annual, native to s. Europe.

- Botrytis cinerea* Pers.: on 2 Alaska [175].
Plasmodiophora brassicae Wor.: club root, hernie: on *I.* sp. PEI 44:110, 45:114, [1138].
Puccinia aristidae Tracy (*P. subnitens* Diet.): rust, rouille: on 2 Sask 52:115, [cf. 15, p. 157].
Rhizoctonia solani Kühn: on *I.* sp. Man [93, p. 125].
 ?Aster yellows virus: aster yellows, jaunisse de l'aster: on *I.* sp. NB 36:75.

Ilex L.

AQUIFOLIACEAE

Evergreen or deciduous trees and shrubs of N. and S. America and Asia, with a few in Africa, Australia and Europe.

1. *I. aquifolium* L., English holly, houx; Europe and Asia; cult. in Canada in BC.
2. *I. verticillata* (L.) Gray, black alder, aulne blanche; in Canada from Nfld to Ont.

- Boydia insculpta* (Oud.) Grove: canker, chancre: on *I.* BC [25].
Ceuthospora phacidioides Grev.: on *I.* BC F57:86, [1199].
Dermea peckiana (Rehm) Groves: on 2 Ont [362, p. 69], Ont Que [370].
Microsphaera penicillata (Wallr. ex Fr.) Lév. (*M. alni* (Wallr.) Salm.): on 2 NS [1138].
Phyllosticta sp. (*Phoma* sp.): leaf spot, tache des feuilles: on *I.* BC [535].
Phytophthora ilicis Buddenhagen & Young: leaf and twig blight, brûlure: on *I.* BC 58:104.
Pratylenchus sp. and *Criconeumoides* sp.: associated with plant decline of *I.* BC 53:118, 57:117, [104].
Protococcus sp.: green scum: on leaves and twigs of *I.* BC 58:104.
Rhytisma spp.: tar spot, tache goudronneuse: *R.* sp. on *I.* sp. BC 34:85, 48:97. *R. ?prini* (Schw.) Fr. (*R. concavum* Ell. & Kell., *R. ilicis-canadensis* Schw.) on 2 Que 32:103, 34:103.
Synchytrium vaccinii Thomas (not *S. aureum* Schroet.): on *I.* sp. NS [542, 1138].
Trochila ilicis (Chev.) Rehm: on shed leaves of *I.* BC 56:119, F57:86, [1203].

Impatiens L.

BALSAMINACEAE

Annual or perennial herbs mostly in mountainous regions in tropical and subtropical Asia and Africa, a few in temperate Eurasia and N. America.

1. *I. balsamina* L., garden balsam, balsamine; native to s. and e. Asia; many cult. forms.
2. *I. capensis* Meerb. (*I. biflora* Walt.), touch-me-not, biflore chou sauvage; Nfld to Alaska and s. into the US.
3. *I. noli-tangere* L., touch-me-not, herbe de Sainte-Catherine; from central Alaska to Alta and Man in Canada; also in Eurasia.
4. *I. pallida* Nutt.; in Canada from Nfld and NS to Sask.

- Cronartium flaccidum* (Alb. & Schw.) Wint.: rust, rouille: II on *I.* PEI [15, p. 30; 1138].
Fusarium spp.: *F. acuminatum* Ell. & Ev., *F. oxysporum* Schlecht. from basal parts and roots of *I.* Man 41:93, [335].
Plasmopara obducens Schroet.: on 2 Man [93, p. 31], Que 31:121.
Pleospora sp.: on leaves of *I.* Que 56:128.
Puccinia argentata (Schultz) Wint.: II III on 2, 3 Alta [739]; on 2 Sask [93, p. 66]; on 2 Sask, 4 Alta [15, p. 308].
P. recondita Rob. ex Desm. (*P. rubigo-vera* Wint.): 0 I on 2 Man [93, p. 71], NS [1138]; on 2 Man Ont Que, 4 Ont [15, p. 183].
Ramularia impatientis Pk.: on ?2 Man [93, p. 124].
Stemphylium botryosum Wallr.: leaf spot, tache stemphylienne: on *I.* BC 58:109.
Verticillium sp.: wilt, flétrissure verticillienne: on *I.* Ont 32:87.

Inula L.

COMPOSITAE

Usually perennial herbs native to Europe, Asia and Africa; showy plants cult. in borders and gardens; also a source of inulin.

1. *Inula helenium* L., elecampane, aulnée; native to Europe and n. Asia; naturalized in NS, Que and s. Ont and in the US.

- Erysiphe cichoracearum* DC. ex Méral: powdery mildew, blanc: on *I.* Que 41:93.

Ipomaea L.

CONVOLVULACEAE

Annual or perennial herbaceous twiners, erect herbs and even shrubs and trees, native to many parts of the world, particularly to the tropics.

1. *I. batatas* (L.) Lam., sweet potato, patate douce; a cultigen from the tropics.
2. *I. purpurea* (L.) Lam., common morning glory, gloire du matin; native to tropical America; cult. for its showy flowers.

- Cercospora* sp.: on leaves of 2 NB 34:87.
Diplodia tubericola (Ell. & Ev.) Taub.: Java black rot: from rotted *I.* in storage Alta 42:65.
Fusarium sp.: on *I.* grown in Ont in 1939, 40:53.
F. equiseti (Cda.) Sacc.: from *I.* imported into Ont [335].
Pythium sp.: from rotted roots of *I.* grown in Ont 43:72.
Rhizopus sp.: from rotted roots of imported *I.* Sask 43:72.

Iris L.

IRIDACEAE

Perennial bulbous or rhizomatous plants of the northern hemisphere; several species are well-known garden perennials and are represented by numerous cultivars.

1. *I. germanica* L., German iris, fleur de lis, of central and s. Europe, and other rhizomatous iris including la, *I. foetidissima* L., 1b, *I. halo-*

Iris

- phila* Pall., 1c, *I. kaemferi* Sieb., and 1d, *I. sibirica* L.
- I. versicolor* L., blue flag, clajeux; in Canada from Labr, Nfld and NS to Man.
 - I. xiphioides* Ehrh., English iris, iris d'Angleterre, and other bulbous iris including 3a, *I. reticulata* Bieb.
- Botryotinia convoluta* (Drayt.) Whetz. (*Sclerotinia c.* Drayt.): gray-mold rhizome rot, moisissure grise des rhizomes: on 1 BC 38:14, Ont [265, p. 306; 1157]; a rare disease in Canada.
- Botrytis cinerea* Pers.: associated with a blight of blossoms of ?1 BC [535], NB 60:68, PEI 29:69.
- Cladosporium herbarum* Lk.: on leaves of ?1 Que 40:93.
- Colletotrichum dematium* (Pers. ex Fr.) Grove (*C. liliacearum* Ferr.): on leaves of ?1 Man 45:114.
- Didymellina iridis* (Desm.) Höhn.: on overwintered leaves of *I. sp.* Sask [93, p. 53]; but see below.
- D. macrospora* Kleb. (stat. conid. *Heterosporium iridis* (Fautr. & Roum.) Jacques, *H. gracile* auct. non (Wallr.) Sacc.): leaf spot, tache hétérosporienne: the conidial state is common in cult. iris, both rhizomatous and bulbous BC to PEI 24:55, 25:71, 26:35, 30:88, 34:86, [cf. 93, p. 120; 1138]; usually heavy only late in the season. The disease was severe under poor drainage conditions BC 37:77, under a medium pH of the soil Que 46:55, probably as a result of lack of lime. The disease may reduce bulb size BC 48:109, and the market value of the cut bloom BC 52:115. Several *I. spp.* have been recorded as hosts: Man 34:86, [93], BC 48:103; on 2 Que 32:103, but record unsupported by specimens.
- Ditylenchus destructor* Thorne: potato bulb nematode, nématode de la pomme de terre. The nematode affecting iris bulbs was originally identified as the bulb and stem nematode, *D. dipsaci* (Kühn) Filipjev (*Tylenchus d.* Kühn), BC 32:90, [426], and in imported bulbs [786]. However, it was found to be morphologically indistinguishable from *D. destructor* and potatoes were successfully infected from iris [424]; see also [1990a]. Moreover, potatoes were found naturally infected on a plot that had produced a crop of infected iris [102]. The pest occurs rather widely in the limited area devoted to commercial iris, but improved crop rotation and the practice of treating the bulbs in hot water have greatly reduced its incidence in commercial plantings, 54:133. An immersion of iris bulbs in water was most effective at 110-112 F for 6 min and safest when applied between July 26 and Aug. 9 [422, 423].
- Erwinia carotovora* (L.R.Jones) Holland: soft rot, pourriture molle due rhizome: on *I. spp.* cult. BC-PEI 24:55, 26:35, 29:69, 30:89, 31:96, 30:104, [cf. 93, p. 28; 1138]. Decay of rhizomes is common but rarely serious; sometimes associated with the iris borer, *Macronoctus onusta* Grote, Sask 32:90, Ont 23:130.
- Fusarium sp.* and *Pythium sp.*: root rot, pourriture des racines: on *I. sp.* Sask 40:93; on 1d Sask 45:114.
- Low-temperature basidiomycete, basidiomycète frigophile: isolated from 1 Alta 43:109, [215].
- Meliogogyne hapla* Chitwood: on iris from greenhouse Alta 60:107.
- Mollisia iridis* (Rehm) Sacc.: on *I. sp.* Ont [979].
- Mycosphaerella tassiana* (de Not.) Johans.: on 1 BC [50].
- Mystrosporium adustum* Masee: ink disease, maladie d'encre: common on 3 BC 37:78; sometimes severe in a planting, 40:94, 45:114.
- Penicillium spp.*: bulb rot, pourriture penicillienne: on 3 BC 33:70; on imported bulbs BC 32:90, Ont 45:114, among the fungicides tested, chloranil (Spergon) and thiram (Arasan) applied as dusts prevented the development of *Penicillium*.
- Phyllosticta iridis* Ell. & Martin: leaf spot, tache foliaire: on iris BC 32:90; on 2 NS [1138].
- Pleospora herbarum* (Fr.) Rahb.: on 1 BC [50].
- P. phaeocomoides* (Berk. & Br.) Wint. (*P. vulgaris* Niessl var. *ferruginea* Wehm.): on 1 BC [50].
- Puccinia iridis* Rahb.: rust, rouille: II only on *I. sp.* NS PEI, 2 NB NS [1138]; on *I. sp.* NB 26:35, PEI 46:85; on 1a PEI 36:77; on 1b Que 43:109; on 2 Man [93, p. 69], NB 30:89, NS 26:35, Ont Que NS [15, p. 227].
- P. sessilis* Schneid. ex Schroet.: 0 I on 2 Man [93, p. 71], Ont [828], Que [15, p. 131; 197].
- Rhizoctonia solani* Kühn: associated with decay of leaf bases of 1c Man 45:114.
- Sclerotinia sclerotiorum* (Lib.) de Bary: on bulbous iris plants BC 54:133, [535].
- Sclerotium delphinii* Welch: associated with a rot of iris bulbs in trays BC 57:126, and a crown rot of 1 NB 31:96.
- S. tuliparum* Kleb.: gray bulb rot, pourriture grise des bulbes: on 3 BC 40:94, [535].
- Typhula umbrina* Remsb.: on *I. sp.* Ont [877, p. 77].
- Xanthomonas tardicrescens* (McCull.) Dowson (*Bacterium t.* McCull., *Phytomonas t.* (McCull.) Burkh.): bacterial leaf blight, brûlure bactérienne: on *I. spp.* Que 41:93, NB 60:68; light to severe infections on 1, 3a Que 42:101.
- Iris mosaic virus: stripe, strie virale: on 3 BC 35:69, Man 43:109, Ont 31:96, on imported bulbs Ont 46:85; on iris Alta 32:90, Man 47:111. At one time very prevalent on Wedgewood, 43:109, but virus-free stocks have been built up by roguing, 54:133, or by growing an immune strain of the cultivar, 53:118, so that now the disease is of little economic importance.
- Blindness, stérilité: a physiological disorder: recorded once on bulbous iris Ont Que 46:85.

Iva L.

COMPOSITAE

Herbaceous or shrubby coarse plants of N. America.

- I. axillaris* Pursh, povertyweed, herbe de pauvreté; in Canada from Man to BC; a persistent perennial weed.
- I. xanthifolia* Nutt., false ragweed; in Canada abundant in and native to Man, Sask and Alta, less common in BC and in Ont and Que, where it has been introduced; an annual weed.

Albugo tragopogonis (Pers.) S.F.Gray: on 1 Sask [93, p. 29].

Basidiophora kellermanii (Ell. & Halst.) Wils.: common on 2 Man [93].

Phyllosticta ivicola Ell. & Ev.: on 2 Man [93, p. 135].

Puccinia intermixta Pk.: 0 I III on 1 Sask [15, p. 338], Sask Man [93, p. 69].

Sclerotinia sclerotiorum (Lib.) de Bary: occasionally on 2 Man [93, p. 42].

Septoria ivicola Ell. & Ev.: on 2 Man 24:79, [92, p. 173], but omitted from [93].

Juglans L.

JUGLANDACEAE

Deciduous trees of N. and S. America, s.e. Europe and e. Asia.

1. *J. cinerea* L., butternut, noyer; in Canada from NB to s. Ont. The wood is used occasionally for boat building and house interiors; the nuts are edible.
2. *J. nigra* L., black walnut, noyer noir; in Canada in s. Ont bordering L. Erie. The wood is durable, easily worked and used extensively for fine furniture, interior work, boat building and gun stocks; the nuts are edible. The tree is also planted for ornament.
3. *J. regia* L., English walnut, noyer commun; s.e. Europe to the Himalayas and China; long cult., particularly for its fruits.
4. *J. sieboldiana* Maxim., Japanese walnut, noyer du Japon; native to China.

Agrobacterium tumefaciens (Sm. & Towns.) Conn: crown gall, tumeur du collet: on 3 NS 51:105.

Botryosphaeria obtusa (Schw.) Shoem.: the conidial state on 1 Ont [996].

Fomes ignarius (L. ex Fr.) Kickx: on 1 Ont 24:49, F54:72, F55:59, NB F54:24.

Fusarium spp.: *F. avenaceum* (Fr.) Sacc.: from discolored spots on fruits of 1 Man [335]; *F. lateritium* Nees: from bark of branches of 3 affected by die-back, dépérissement, BC 44:100, [335].

Gnomonia leptostyla (Fr.) Ces. & de Not. (stat. conid. *Marssonina juglandis* (Lib.) Magn.): leaf spot, tache des feuilles: on 1 Que 24:49, 30:78, NB 28:88, 29:60, F54:35, NS 38:92, on 1, 2 Ont 46:77; on 22 Que 51:105; a common disease of 1, especially in Que.

Melanconis juglandis (Ell. & Ev.) Graves (stat. conid. *Melanconium oblongum* Berk.): canker, chancre: on *J. spp.*, 1, 4 Ont, *J. sp.* Que 46:77; on 1 Ont F55:67, Que 45:103, NB 56:119, NS 50:115; on 22 Ont F63:70, [cf. 479; 1138].

Microstroma juglandis (Bereng.) Sacc. (*M. brachysporum* (Sacc.) Vestergr.): white mold, moisissure blanche: on *J. sp.* Ont 25:62, NS 53:106, 55:116.

Nectria sp.: on 1 NB 55:60.

Phyllactinia guttata (Fr.) Lév. (*P. corylea* (Pers.) Karst.): powdery mildew, blanc: on *J. sp.* BC 53:106.

Polyporus tulipiferae (Schw.) Overh.: white spongy rot, carie blanche spongieuse: on 1 NS 50:115.

P. versicolor L. ex Fr.: causes a white spongy rot: from *J. sp.* BC [791].

Xanthomonas juglandis (Pierce) Dowson (*Pseudomonas j.* Pierce): bacterial blight, brûlure bactérienne: on 3 BC 30:79 et seq.: severe in some years in the few plantings in BC.

Juncus L.

JUNCACEAE

Grasslike or rushlike herbaceous plants; cosmopolitan.

1. *J. alpinus* Vill.; Nfld, Que and NB to BC, also in Eurasia.

2. *J. arcticus* Willd.; arctic N. America s. to Labr, Nfld, Sask and Alta; circumpolar.

3. *J. ater* Rydb.; Alaska and south.

4. *J. balticus* Willd.; in Canada from Labr, Nfld and NS to BC.

5. *J. biglumis* L.; Greenl to Alaska, s. Labr and BC.

6. *J. castaneus* Sm.; arctic N. America s. to Labr, Que and n. Man.

7. *J. drummondii* E.Mey.; Alaska and south.

8. *J. dudleyi* Wieg.; from Nfld and NS to BC.

9. *J. effusus* L.; Nfld and NS to n. Ont and s.e. Alaska.

10. *J. filiformis* L.; Greenl and Labr to Alaska, s. to Nfld and NS.

11. *J. longistylis* Torr.; Nfld, Que and Ont, Man to BC.

12. *J. tenuis* Willd. (*J. macer* S.F.Gray); Nfld and Labr to BC and Alaska.

13. *J. trifidus* L., highland rush, jonc à trois pointes; Nfld and Que and in Eurasia.

14. *J. triglumis* L.; circumboreal.

15. *J. xiphioides* E.Mey.; Calif and Ariz.

Belonidium juncisedum (Karst.) Rehm (*Mollisia junciseda* Karst.): on 2, 6, 13 Greenl [899]; on 5 Greenl [602, 603].

Conractia junci (Schw.) Trel.: on 5 Frank [971]; on 8 Ont [969]; on 12 Ont Que NS [292], NS [1138]. In contrast to the localized nature of infection by the species of *Anthracoidea*, *C. junci* is systemic in its hosts [969, cf. 572].

Clathrospora elynae Rabh. (*Pleospora e.* (Rabh.) Ces. & de Not.): on 2 Mack [250], Greenl [900, 902].

Endodothella junci (Fr.) Theiss. & Syd.: on stems of *J. spp.*, common, NS [1138].

Hendersonia arundinacea (Desm.) Sacc.: on 5 Greenl [603].

H. luzulae West.: on 14 Greenl [900].

Hysteropezizella pusilla (Lib.) Nannf. (*Naevia p.* (Lib.) Rehm, *Trochila juncicola* Rostr.): on 2 Man, 5 Frank [604]; on 2 Greenl [900]; on 5 Frank [600]; on 13, 14 Greenl [899]; on 13 Greenl [901].

Leptosphaeria caricinella Karst.: on 6 Frank [52].

L. culmifraga Ces. & de Not.: on 5 Greenl [602].

L. eustoma (Fckl.) Sacc.: on 2, 5 Frank [52].

L. juncina (Auersw.) Sacc.: on 5 Frank [52], Greenl [899].

L. microscopica Karst.: on 5 Greenl [602].

L. petkovicensis Bubák & Ranoj.: on *J. spp.* BC [50].

Leptothyrium juncinum Cke. & Harkn.: on 7 Alaska [175].

Mollisia alpina Rostr.: on 1 Greenl [900, p. 609; 979].

Mycosphaerella caricicola (Fckl.) Lindau: on 7 BC [50].

M. lineolata (Rob.) Schroet.: on overwintered leaves of 5 Frank [52].

M. perexigua (Karst.) Johans.: on *J. sp.* Que, 5 Frank [52]; on 5 Greenl [603].

Juncus

- Mycosphaerella tassiana* (de Not.) Johans.: on 5 Frank [604, 903], Greenl [602, 603].
- M. tassiana* var. *tassiana*: on 2, 5 Frank [52].
- Phaeosphaerella pheidasca* (Schroet.) Sacc.: on stems of *J.* sp. NS [1138].
- Phomatospora argyrostigma* (Berk.) Sacc.: on 7 BC [50].
- Phyllachora junci* (Fr.) Fckl.: on 2 Greenl [900]; on 10 Greenl [899].
- Platyspora pentamera* (Karst.) Wehm. (*Clathrospora p.* (Karst.) Berl.): on *J.* sp. Frank [604]; on 2, 5 Frank [52]; on 5 Greenl [603].
- Pleospora ambigua* (Berl. & Bres.) Wehm.: on 5 Frank [52].
- P. junci* Pass. & Beltr. (*P. spinosella* Rehm): on 14 Man [604].
- Selenophoma drabae* (Fckl.) Petr. (*Rhabdospora d.* (Fckl.) Berl. & Vogl., *R. groenlandica* Lind): on 5 Greenl [601, 603].
- Septoria junci* Desm.: on 13 Greenl [899].
- Urocystis junci* Lagerh.: on 5 Frank [971].
- Uromyces junci* (Desm.) Tul.: II III on 3 Alta, 4 Sask Man [15, p. 217]; on 3 Alta 24:59; on 3, 10 Sask, 4 Sask Man, 8 Man [93, p. 73]; on 4 PEI 26:38, [1138].
- U. junci-effusi* Syd.: II III on 4, 9, 10 NS [956]; on 9 Ont [828]; on 10 NS, 15 BC [15, p. 217], [cf. 1138].
- U. silphii* Arth.: II III on 9 Ont [828]; on 11, 12 Sask [93, p. 73], on 11 Man, 12 Ont [15, p. 218]; on 12 NS PEI [1138].
- Wettsteinina niessli* Müll. (*Leptosphaeria gigaspora* Niessl): on 5 Greenl [602].

Juniperus L.

CUPRESSACEAE

Evergreen trees or shrubs almost exclusively in the northern hemisphere; numerous cultivars grown for ornament.

1. *J. chinensis* L., Chinese juniper, genévrier chinois; e. Asia and Japan, including la, *J. c.* var. *pfitzeriana* Mast.
2. *J. communis* L., common juniper, genévrier; mainly represented in Canada by 2a, *J. c.* var. *depressa* Pursh (*J. canadensis* Burgsd.), from Nfld and NS to Alta, and 2b, *J. c.* var. *saxatilis* Pall. (*J. c.* var. *montana* Ait., *J. alpina* S.F.Gray, *J. sibirica* Burgsd.), in exposed places from Greenl to Alaska, s. to Nfld, NS and Que; and by the cult. vars. 2c, *J. c.* var. *hibernica* Gord., Irish juniper, and 2d, *J. c.* var. *suecica* Ait., Swedish juniper.
3. *J. horizontalis* Moench, creeping savin, savinier; Nfld and NS to Alaska. One cultivar is 3a, *J. h.* var. *douglasii* Rehd., Waukegan juniper.
4. *J. oxycedrus* L.: Mediterranean region to Iran.
5. *J. sabina* L., savin, genévrier; mts. of central and s. Europe, Asia Minor and the Caucasus, commonly as 5a, *J. s.* var. *tamariscifolia* Ait., and 5b, *J. s.* var. *variegata* (West.) Audib.

6. *J. scopulorum* Sarg., Rocky Mountain red cedar, genévrier des Montagnes Rocheuses; in Canada in the foothills and mts. of s. Alta and s. BC. The tree has little commercial importance in Canada.

7. *J. virginiana* L., red cedar, cèdre rouge; represented in Canada by 7a, *J. v.* var. *crebra* Fern. & Grisc., in parts of s. Ont and s.w. Que. Wood valuable for mothproof chests and wardrobes and also used locally for fence posts.

Cercospora juniperina (Georg. & Badea) Georg. & Badea (*C. sequoiae* Ell. & Ev. var. *juniperi* Ell. & Ev.): on 2 BC [1198]; on 2a Sask 34:103, [cf. 190, p. 440].

Coccomyces juniperi Karst.: on *J.* sp. Greenl [900].

Coniothecium toruloides Cda.: on *J.* sp. Greenl [900].

Corticium pelliculare Karst.: on *J.* sp. Man [93, p. 76]; see *Abies*.

Coryneum paraphysatum Rostr.: on 2b Greenl [899].

Cytospora ?dubyi Sacc.: associated with dieback of 5 NS 51:105.

Dinemasporium glabulicola Rostr.: on *J.* sp. Greenl [900, p. 627].

Exosporium glomerulosum (Sacc.) Höhn.: on 2a Ont [548, p. 530].

Gloeocystidiellum lividocoeruleum (Karst.) Donk (*Aleurodiscus lividocoeruleus* (Karst.) Lemke): on 3 Man [616].

Godronia juniperi Rostr.: on *J.* sp. Greenl [900, p. 611].

Gymnosporangium betheli Kern: rust gall, rouille-tumeur: III on 6 cult. Man 43:97, 45:103, 51:106.

G. clavariiforme (Pers.) DC.: rust gall, rouille-tumeur: III on 2 BC [535]; on 2, 2a BC [1198]; on 2a Ont 33:114, [828], Que 32:64, NS 32:103; on 2c NS 29:76, PEI 29:98, [cf. 1138]; on 2d BC 42:93; on 2d imported into Ont 37:67. This is one of the most widespread species of *Gymnosporangium* as it is known to occur also in Europe, n. Africa and Japan; there is the possibility that it has been introduced into N. America.

G. clavipes (Cke. & Pk.) Cke. & Pk. (*G. germinale* Kern): rust gall, rouille-tumeur: III on *J.* spp. cult., including 2a, 2d, 4, 5, 5a, Ottawa, Ont 34:89, where it was abundant on 2, rare on 5 and not present on 1 and 7. Its absence in the Ottawa area on 7 is a clear indication that the rust is specialized into distinct races that occur on host species in the sections *Oxycedrus* and *Sabina* respectively.

On 2 BC [1198]; on 2 Man, 2b Sask [93, p. 64]; on 2 Man, 7 Ont [15, p. 363]; on 2a Sask 34:103, Man 51:106, Ont 33:114, Que 32:64, NS 34:90; on 2c NS 29:76; on 4 Que 33:114; on 7 Ont 36:70, 46:77, 54:123. A very common species in E. Canada and of considerable economic importance in apple orchards.

G. connersii Parmelee [830a, p. 245]: 0 I on *Crataegus* spp. Man, Ont, Que, III on 3 Que [830a].

G. corniculans Kern: rust gall, rouille-tumeur: III on 3 Sask Man [15, p. 378; 93, p. 64], Ont [828]; on 3, 3a, 7 cult. Man 45:103.

G. cornutum Arth. ex Kern (*G. aurantiacum* Chev., *G. juniperi* Chev. nom. confusa): rust gall, rouille-tumeur: III on *J.* sp. (as *G. juniperinum*) Greenl [900]; on 2a Ont [828], Que 32:64; more common than these records suggest.

- Gymnosporangium fuscum* DC. (*G. sabinae* Dicks. ex Wint.): rust gall, rouille-tumeur: on *Ia* intercepted in Ont, on 5 Winona, Ont 5b Victoria, B.C. [1205]; on 5 intercepted Que F61:54. Ziller's report records for the first time the occurrence of this imported rust on *Pyrus communis* in Canada, indicating an active infection center; it is hoped to eradicate the infestation.
- G. globosum* Farl.: rust gall, rouille-tumeur: on *J.* spp. cult., including 7 Ottawa, Ont 34:89; on 7 Ont 33:72, [15, p. 375; 828], Que 35:71; on imported 7 Ont 34:90; ? or an undescribed species on 3 Sask [93, p. 64].
- G. inconspicuum* Kern: III on 6 BC [1198; cf. 15, p. 361].
- G. juniperi-virginianae* Schw.: cedar-apple rust, rouille de Virginie: III on 7 Ont 25:63, 39:98; on imported 7 Ont 34:90, Que 40:86. This is the only species where the mycelium is not perennial in the telial host, the rust galls normally maturing the second season and then falling off.
- G. nelsoni* Arth.: rust gall, rouille-tumeur: III on 6 BC 48:97, 49:96, [535, 1198], Alta F61:105.
- G. nidus-avis* Thaxt. (*G. juvenescens* Kern): witches' broom, rouille-balai de sorcière: III on 3 Alta F53:131, Alta Sask F51:143, Sask [15, p. 365; 93, p. 64]; on 6 BC [1198]; on 7 Ont 41:82, [cf. 15, p. 369].
- G. tremelloides* Hartig (*G. juniperinum* Mart. nom. confusum): rust gall, rouille-tumeur: III on 2 BC [1198]; on 2b Alta [15, p. 368]; on 7 cult. BC [535].
- G. tubulatum* Kern ex Arth.: III on 6 BC F60:91, [1198; cf. 15, p. 368]. These rusts are still imperfectly known, but an account of their geographical distribution in N. America by Crowell [229] is of interest.
- Hendersonia foliicola* (Berk.) Fckl.: on *J.* sp. Greenl [900].
- Henriquesia cinerescens* (Duby) Sacc.: on dead trunks of *J.* sp. Greenl [899].
- Herpotrichia nigra* Hartig: on *J.* sp. Greenl [900]; on 2 BC [1198]; on 6 Alta F59:92.
- Hysterium acuminatum* Fr.: on twigs of 3 Man [93, p. 43].
- Karschia deformata* Pk.: on dead twigs of 3 Sask [93, p. 40].
- Lophodermium juniperinum* (Fr.) de Not.: needle cast, rouge: on 2a NS 51:116, [1138]; on 2a, 3, 7 Ont 46:77, [236]; on 2b Greenl [899, 901]; on 3 Man [93, p. 43].
- Mytilidion* sp.: on *J.* sp. BC [1199].
- M. decipiens* (Karst.) Sacc.: 2a, 2b Que [53].
- Peniophora nuda* (Fr.) Bres.: on old branch of 2 Man [93, p. 78].
- P. sambuci* (Pers.) Burt: on *J.* sp. Man [93]; see *Acer*.
- Pestalotia funerea* Desm.: on *J.* sp. Greenl [900], NS [1138]; on *Ia* BC [535].
- Phoma* sp.: cause of a twig blight of 6 Man 43:97.
- P. galbulorum* Sacc.: on *J.* sp. Greenl [900].
- Phomopsis juniperovora* Hahn: twig blight, brûlure des rameaux: on 7 cult. Ont 46:77; on imported 5 and *J.* "plumosa" Que F61:54.
- Polyporus hirtus* Quél.: on 6 BC F61:124.
- Roestelia bruceensis* Parmelee [830a, p. 259]: on 3 Ont [830a]; first referred to *Gymnosporangium bermudianum* (Farl.) Earle, 56:119, [828].
- Stigmatea juniperi* (Desm.) Wint.: on leaves of 2 Man [93, p. 47]; on 6 BC [1198].

Kalanchoë Adans.

CRASSULACEAE

Erect branched succulents, mostly in Africa and Madagascar, a few in tropical Asia and one in Brazil.

Botrytis cinerea Pers.: cause of a leaf blight of plants in greenhouse BC 57:127.

Oidium sp.: powdery mildew, blanc: on a house plant Sask 45:115; possibly referable to *Erysiphe polyphaga* Hammarlund, 48:105.

Thielaviopsis basicola (Berk. & Br.) Ferr.: associated with a root rot of *K.* sp. NS [1138].

Kalmia L.

ERICACEAE

Evergreen shrubs of N. America.

1. *K. angustifolia* L., sheep laurel or lambkill, crevard des moutons; in Canada from Labr, Nfld and NS to Man.
2. *K. polifolia* Wang., bog laurel; Labr to Alaska, s. to Nfld and NS and into the US.

Amerodopsis sp.: on 2 Alaska [175].

?*Dothidea denigrans* Sacc.: on 2 Alaska [175].

Exobasidium vaccinii Wor.: on 2 Alaska [175], BC [958].

Gibbera kalmiae (Pk.) Barr (*Venturia k.* Pk.): on 1, 2 Que [53, p. 315]; on 2 Alaska [175].

Gibberidea kalmiae (Pk.) Barr (*Leptosphaeria k.* Pk.): on stems of 1 Que [53, p. 311], NS [1138].

Lophodermium exaridum (Cke. & Pk.) Sacc.: on leaves of 1 NS [1138].

Mycosphaerella colorata (Pk.) Earle: on 1 Que 32:103, [53], NS [1138]; on 1, not *K. latifolia* L., Que 33:114.

Phyllachora kalmiae (Pk.) Petr. (*Dothidella k.* (Pk.) Sacc.): on *K.* spp. Ont NS, 2 Que [53]; on shoots of 1 NS [1138].

Synchytrium vacinii Thomas: on 1, 2 NS [1138].

Kobresia Willd.

CYPERACEAE

Perennial sedges of northern regions.

1. *K. myosuroides* (Vill.) Fiori & Paol. (*Elyna bellardi* (All.) K.Koch, *Kobresia b.* (All.) Degel.); Alaska to Greenl, s. to BC, Oregon and NM.
2. *K. simpliciuscula* (Wahl.) Mack. (*K. caricina* Willd.); Greenl to Alaska, s. to Nfld, and Que.

Anthracoida elynae (Syd.) Kukkonen [572, p. 65] var. *elynae* (*Cintractia e.* Syd., *C. carpophila* (Schum.) Liro var. *e.* (Syd.) Savile p.p.): on 1 BC Yukon Frank Que Labr Greenl [571], Frank [971].

A. lindebergiae (Kukkonen) Kukkonen (*Cintractia l.* Kukkonen): on 2 Alaska Mack Keew Que Greenl [571], Man [952], BC Man Frank [572, p. 68].

Arthrimum puccinioides (DC.) Kze. (*Goniosporium p.* (DC.) Lk.): on 2 Frank [903].

Cintractia caricis (Pers.) Magn. sensu lat. (*Ustilago c.* (Pers.) Ung.): on 1 Greenl [601, 899, 903], Frank [903]; on 1, 2 Frank [605], Que [292].

Kobresia

Hysteropezizella ignobilis (Karst.) Lind (*Trochila i.* Karst.): on 1 Frank [604], Greenl [899, 901]; on 2 Greenl [901].

Mycosphaerella perexigua (Karst.) Johans.: on 1 Frank [604].

M. pusilla (Auersw.) Johans. (*Sphaerella p.* Johans.): on 2 Greenl [899].

M. tassiana (de Not.) Johans.: on 1 Frank [903].

M. tassiana var. *arctica* (Rostr.) Barr: on 2 Frank [52].

Platyspora pentamera (Karst.) Wehm. (*Clathrospora p.* (Karst.) Berl., *Pleospora p.* Karst.): on 1 Frank [604], Greenl [903].

Schizonella melanogramma (DC.) Schroet.: on 2 Frank [292].

Selenophoma drabae (Fckl.) Petr. (*Rhabdospora d.* (Fckl.) Berl. & Vogl., *R. groenlandica* Lind): on 1 Greenl [601, 602, 603].

Septoria punctoidea Karst.: on 1, 2 Frank [903], Greenl [901].

Kochia Roth

CHENOPODIACEAE

Annual or perennial herbs, mostly in the Old World, four in w. America.

1. *K. scoparia* (L.) Schrad., summer cypress, petits soldats; annual of Eurasia and escaped in N. America.

Aster yellows virus: aster yellows, jaunisse de l'aster: on 1 Sask 58:114.

Koeleria Pers.

GRAMINEAE

Tall annual or perennial grasses of temperate regions.

1. *K. cristata* (L.) Pers. (*K. gracilis* Pers.), June grass; in Canada from Que to BC, also in Eurasia; a good forage grass.

Claviceps purpurea (Fr.) Tul.: 1 artificially infected with rye ergot [172].

Drechslera poae (Baudys) Shoem. (*Helminthosporium vagans* Drechsl.): on 1 Man 43:39; an unconfirmed record.

Epichloë typhina (Pers.) Tul.: on 1 Sask 25:79, but not recorded by Bisby [93, p. 46].

Leptosphaeria typharum (Desm.) Karst., sensu Berl.: on 1 BC [50].

Mycosphaerella tassiana (de Not.) Johans.: on 1 BC [50].

Puccinia graminis Pers.: II III on 1 cult. Morden, Man 45:43, [cf. 13, p. 297].

P. koeleriae Arth.: II III on 1 Sask [15, p. 149; 93, p. 69]; the 0 I states on *Mahonia* are recorded from BC.

P. monoica Arth.: II III on 1 Sask [93, p. 69], Man 45:43, [cf. 15, p. 147].

Koenigia L.

POLYGONACEAE

Annual herbs of the arctic regions.

1. *K. islandica* L.; in Canada most abundant in the southern e. Arctic.

Mycosphaerella polygonorum (Crié) Lind (*Sphaerella p.* (Crié) Sacc.): on 1 Greenl [899].

Ustilago koenigiae Rostr.: on 1 Greenl [899, p. 532].

Laburnum Medic.

LEGUMINOSAE

Ornamental deciduous trees or shrubs of s. Europe or w. Asia, cult. for their showy flowers.

1. *L. anagyroides* Medic., golden chain, ébénier; native to e. Europe.
2. *L. alpinum* Bercht. & Presl, Scotch laburnum, aubours; from the mts. of s. Europe.
3. \times *L. walteri* Dipp. (*L. anagyroides* \times *L. alpinum*).

Cucurbitaria laburni (Pers. ex Fr.) de Not.: canker, chancre des rameaux: on *L. sp.* PEI 57:117.

Fusarium lateritium Nees: isolated from cankers on 3 Ont 48:97, [335].

Lachenalia Jacq.

LILIACEAE

Small bulbous scapous plants of s. Africa; two or three often grown in pots.

Tomato spotted wilt virus: spotted wilt, tache de bronze: recorded as severe in a collection of *L. spp.* at the Montreal Botanical Garden, Que 43:109.

Lactuca L.

COMPOSITAE

Annual or perennial leafy-stemmed herbs, mostly of the northern hemisphere; a few are weeds and one is cultivated for greens.

1. *L. biennis* (Moench) Fern. (*L. spicata* Hitchc., non *Sonchus s.* Lam.), tall blue lettuce, and la, *L. b. f. integrifolia* (Torr. & Gray) Fern. (*L. s.* var. *integrifolia* (T. & G.) Gray); in Canada from Nfld and NS to BC.
2. *L. canadensis* L., devil's weed, chicorée blanche; a biennial, in Canada from NS and PEI to Ont.
3. *L. pulchella* (Pursh) DC., blue lettuce, laitue bleue; in Canada practically confined to BC and the Prairie Provinces, rare in Ont and Que, also in Alaska, a native weedy perennial.
4. *L. sativa* L., lettuce, laitue; annual herb widely grown for its highly developed radical leaves. 4a, *L. s.* var. *asparagina* Bailey, celtuce; a native of Eurasia.
5. *L. scariola* L., prickly lettuce, escarole; in Canada from PEI to BC, abundant in Ont and common in the Prairie Provinces; naturalized from Europe.

Alternaria sp. of the *brassicae* type: leaf spot, tache des feuilles: on 4a Man 44:44; from seed of 4 BC and infected experimentally 4, 4a, 44:44, 47.

Botrytis cinerea Pers.: gray mold, moisissure grise: on 4 Alaska [175], BC to Nfld except Alta 24:36, 26:24, 30:42, 50:57, 53:60, 54:56, 55:63. Most prevalent wherever the crop is intensively cult., particularly on seedlings or transplants Ont 31:41, 55:63, 56:60, not uncommon as a bottom rot Ont 53:60, sometimes in association with *Sclerotinia sclerotiorum* or alone BC 46:39, or also with *Rhizoctonia solani*, Ont 57:59; crop rotation effective in control Ont 56:60, [cf. 93, p. 113; 1138]. A strain of *B. cinerea* associated with a severe root rot of 4 in muck soils of the Bradford marsh, Ont, appeared almost confined to the underground parts of the plant [663].

Bremia lactucae Regel: downy mildew, mildiou: on *L. sp.*, 4 NS [1138]; on 3 Sask Man, 4 Sask [93, p. 30]; on 4 BC 31:40, Ont 24:36, Que 34:35, NS 35:29, PEI 25:46; rather common and occasionally severe in seed crops BC 40:36, where it is often followed by *Botrytis cinerea*, 53:60.

Ceratobasidium anceps (Bres. & Syd.) Jackson: on 1 Ont [495].

Erwinia carotovora (L.R.Jones) Holland: soft rot, pourriture molle: on 4 BC 41:36, Ont 27:12, 40:36, Que 58:58; and ? Alta 35:30; apparently rare.

Fungi from seed: of 4: *Alternaria tenuis* auct. sensu Wiltshire, Ont; *Botrytis cinerea* Pers., BC; *Chaetomium murorum* Cda., Conn; *Cunninghamella elegans* Lendner, Calif Pa; *Epicoccum nigrum* Lk., Pa; *Nigrospora oryzae* (Berk. & Br.) Petch, BC; *Oospora lactis* Fres., Man; *Penicillium turbatum* Westling, Ont; *Periconia pycnospora* Fres., Mich; *Stemphylium botryosum* Wallr., Ont; *Verticillium dahliae* Kleb., NY [374].

Marssonina panattoniana (Berl.) Magn.: anthracnose, anthracnose: on 4 Alaska [175], BC Ont 33:26, 114, BC 42:46, Man 39:41, Ont 24:36.

Meloidogyne sp. (*Caconema radiculicola* (Greef) Cobb): root-knot nematode, nodosité des racines: on 4 BC, in greenhouse, 32:110; in field, 33:27.

Ovularia carltonii Ell. & Kell.: on 3 Sask Man [93, p. 122].

Phyllosticta ?mulgedii Davis: leaf spot, tache des feuilles: on 4 Que 59:49.

Pseudomonas marginalis (N.A.Brown) F.L.Stev.: marginal leaf blight, brûlure marginale: on 4 Man 51:51, Ont 33:27.

P. rhizoctonia (Thomas) Burkh.: bacterial rosette, rosette bactérienne: ? on 4 BC 49:47.

P. viridilivida (N.A.Brown) Holland (*Bacterium viridilividum* N.A.Brown): bacterial rot, pourriture bactérienne: on 4 BC 55:63, Ont 24:36, PEI 50:58; the identity of the pathogen seems not to have been formally checked.

Puccinia dioicae Magn. (*P. extensicola* Plowr., *P. patruelis* Arth.): rust, rouille: 0 I on *L. sp.* NS, 1 BC [13, p. 367]; on 1, 1a, 2 NS [1138]; on 2, 4 Ont [828]; on 3, 4 Sask Man [93, p. 68]; on 4 Alta 56:60, Sask 54:66, Man 32:40, Ont 48:44, NS 53:60.

P. minuessensis Thüm. (*P. hemisphaerica* Ell. & Ev.): 0 I II III on 3 BC Alta Sask Man [15, p. 355], [cf. 93, p. 69]. This systemic rust occurs abundantly on 3 from Alta-Man. Permanent infection of the plant may be initiated by inoculating the primary leaves of seedlings or the rhizome buds of older plants with either I or II spores. The perennial mycelium seems to alternate from the binucleate to the uninucleate condition and back, depending apparently

on the maturity of the host tissue affected and the food supply available to the fungus [141].

Rhizoctonia solani Kühn: bottom rot, pourriture basale: on 4 Alta 31:41, Man 46:39, Ont 44:47, Que 33:27; occasionally severe; also the cause of damping-off of seedlings Que 34:35; from seed of 4 Man [374].

Sclerotinia sclerotiorum (Lib.) de Bary: drop, affaissement sclérotique: on 4 BC to Nfld 24:36, 25:46, 26:24, 31:40, 32:40, 36:26, 53:61, [cf. 93, p. 42]; a very common disease but rarely a cause of severe losses.

Septoria lactucae Pass. (*S. lactucae* Pk.): leaf spot, tache septorienne: on 4 Ont 49:47, Que 41:36; on 4a Man 44:45; for synonymy and correct authority see 44:47, 45:54.

Sphaerotheca fuliginea (Schlecht. ex Fr.) Poll. (*S. humuli* (DC.) Burr. var. *f.* (Schlecht.) Salmon): powdery mildew, blanc: on 1 BC 33:114, [50]; on ? 5 BC as *S. castagnei* BC 25:79.

Xanthomonas vitians (N.A.Brown) Starr & Weiss: bacterial wilt, flétrissure bactérienne: ? on 4 BC 49:47.

Aster yellows virus (callistephus virus 1): aster yellows, jaunisse de l'aster: on *L. sp.* NB 30:86; on 4 BC to PEI except Alta 36:26, 41:36, 44:47, 50:58, 57:60, 58:58. This disease is very destructive to lettuce in some seasons, particularly in NS 52:50, and on muck soils in Ont 57:60, but losses are sporadically heavy in almost any area. Repeated applications of DDT afforded some protection, but because of excess residue it may be a doubtful practice.

Lettuce big-vein virus: big vein, hypertrophie des nervures: on 4 Ont 40:36, 58:58, Que 53:61.

Lettuce mosaic virus: mosaic, mosaïque: on 4 Ont 51:51, Que 60:73, NB NS PEI 61:70.

Tobacco necrosis virus: from roots of 4 Ont 61:71.

Element deficiencies, carence des éléments: in 4, boron, NS 50:58, PEI 42:46; calcium, Que 60:73; ?molybdenum, PEI 54:67; potassium, Ont 47:51.

Tipburn, brûlure de la pointe: physiological, physiologique: on 4 BC 24:36, Ont 39:42, NS 47:31, PEI 57:60; on imported 4 Que 52:50.

Lagotis Gaertn.

SCROPHULARIACEAE

Perennial glabrous herbs of arctic and alpine regions of Asia and w. N. America.

1. *L. glauca* Gaertn., native to n.e. Asia. Represented in N. America by 1a, *L. g.* var. *stelleri* (Cham. & Schlecht.) Trautv.; in Alaska, Yukon and e. Asia.

Puccinia gymnandrae Tranz.: on 1 Alaska [175].

Lamarkia Moench

GRAMINEAE

One species, an annual grass of s. Europe, naturalized in s.w. US and sometimes cult. for ornament.

1. *L. aurea* (L.) Moench (*Achyrodes aureum* (L.) Kuntze), golden top, chiendent de Barcelone.

Puccinia coronata Cda.: 1 proved susceptible to *P. c. f. sp. avenae* upon inoculation [312].

Lamium L.

LABIATAE

Low annual or perennial herbs of Eurasia and n. Africa; one or two sometimes cult. as border plants.

1. *L. amplexicaule* L., henbit; established locally in Labr, Nfld, NB and s. Ont; naturalized from Europe.
2. *L. maculatum* L.; escaped from cult. from NS to s. Ont; introduced from Europe.

Peronospora lamii A.Braun: on 1 BC [535].

Lantana L.

VERBENACEAE

Shrubs or herbs, sometimes half climbing, mostly in the tropics and subtropics of the western hemisphere, but also in the Old World; one a popular florist's plant.

1. *L. camara* L., lantana, marie crabe; in tropical America n. to Texas and s. Ga.

Botrytis cinerea Pers.: on *L.* sp. Alaska [175].

Laportea Gaud.

URTICACEAE

Perennial herb or arborescent in the tropics.

1. *L. canadensis* (L.) Wedd., wood nettle, ortée du Canada; in St. Pierre and Miquelon and NS, and from Que to Man; also in the US.

Calloria fusarioides (Berk.) Fr. (stat. conid., *Cylindrocolla urticae* (Pers.) Bonord.): on 1 Man [93, pp. 32, 116].

Phoma nebulosa (Pers.) Mont. in Berk.: on old stems of 1 Man [93, p. 134].

Pyrenopeziza compressula Rehm: on old stems of 1 Man [93, p. 41].

Ramularia urticae Ces.: on leaves of 1 Man [93, p. 125].

Septoria urticae Desm. in Rob.: on 1 Man [93, p. 140].

Lappula Moench

BORAGINACEAE

Annuals found in many regions.

1. *L. echinata* Gilib., blue bur, bardanette; Nfld and NS to Alaska; naturalized from Europe. This annual weed is most abundant in the west.
2. *L. redowskii* (Hornem.) Greene var. *occidentalis* (Wats.) Rydb., native from Man to Alta.

Cercoseptoria lappulae Dearn. & Bisby: on 1 Man [93, p. 114].

Erysiphe cichoracearum DC. ex Mérat: on 1 Man [93, p. 44].

Peronospora echinospermi Swingle: on 1 Sask [93, p. 30].

Puccinia aristidae Tracy: 0 I on 1 Man 33:114, [93, p. 66].

Lapsana L.

COMPOSITAE

Slender branching annuals of Eurasia.

1. *L. communis* L., nipplewort, herbe aux mamelles; in Canada in NS, Que and Ont; naturalized from Europe.

Puccinia lapsanae Fckl.: 0 I II III on 1 BC [535, 1198], Ont 31:122, [15, p. 350].

Ramularia lapsanae (Desm.) Sacc.: on 1 BC [535].

Larix Mill.

PINACEAE

Deciduous coniferous trees of the cool regions of the northern hemisphere, mainly in the mts.

1. *L. europea* Mill., European larch, mélèze; n. and central Europe; long cult.
2. *L. laricina* (Duroi) K.Koch, tamarack or American larch, épinette rouge; in Canada from Labr and Nfld to n. BC and Yukon and in Alaska. The wood is the strongest of the softwoods; resistant to decay, it is used for railway ties, posts and telegraph poles.
3. *L. lyallii* Parl., alpine larch, mélèze de Lyall; in Canada high in the mts. of Alta and BC. A tree of little value for timber, but important in controlling runoff and erosion.
4. *L. occidentalis* Nutt., western larch, mélèze occidental; in Canada in the mts. of s. BC. An important tree of the BC interior; the wood has a variety of uses.
5. *L. sibirica* Ledeb., Siberian larch, mélèze de Sibérie; from n.e. Russia to Siberia.

Other hosts: 6, *L. gmelini* (Rupr.) Litvin., Dahurian larch. 7, *L. leptolepis* (Sieb. & Zucc.) Gord., Japanese larch.

Aleurodiscus spinigei Rogers & Lemke: on 4 BC [599, p. 265].

Arceuthobium campylopodum Engelm. f. *laricis* (Piper) Gill.: dwarf mistletoe, faux-gui: on 4 BC F51:150, [570].

Armillaria mellea (Vahl ex Fr.) Kummer: root rot, pourridié-agaric: on 2 Man F58:73; on 4, 7 BC F62:121.

Coccomyces cembrae Rehm: on 2 NS [1138].

Coniophora puteana (Schum. ex Fr.) Karst.: brown cubical rot, carie brune cubique: from decay of 4 BC F58:102, [1203].

Corirolellus variiformis (Pk.) Sarkar (*Trametes* v. Pk.): brown cubical rot, carie brune cubique: from 2 Man F52:96.

Corticium galactinum (Fr.) Burt: white stringy rot, carie blanche filandreuse: from 2 NB NS F53:22; from 4 BC F58:102, [1203]; see *Abies*.

Cytospora abietis Sacc.: on 2 Sask F53:108.

Dasyscyphus calycinus (Schum.) Fckl.: dieback, dépérissement dasyscyphéen: on 3 Alta F53:131.

D. oblongosporus Hahn & Ayers: on 2 NB F54:25.

D. occidentalis Hahn & Ayers (*Lachnella o.* (H. & A.) Seav.): on 2 Alaska [175], NS [1138]; on 4 BC

[979, 1198], after defoliation by *Hypodermella laricis*, F53:156.

Durella sp.: on drought-killed branches of 2 Alaska [555].

Fomes nigrolimitatus (Rom.) Egel.: on 4 BC [1198].

F. officinalis (Vill. ex Fr.) Neuman: recorded on 4 BC [1198].

F. pini (Brot. ex Fr.) Karst.: red ring rot, carie blanche alvéolaire: from 2 Ont F53:79 et seq., NB F53:20; on 4 BC F53:132, [1198].

F. pinicola (Sw. ex Fr.) Cke.: brown cubical rot, carie brune cubique: on 2 Ont [740]; on 4 BC [1198].

Fusarium sambucinum Fckl. var. *coeruleum* Wr.: from damped-off seedlings of 5 Sask [335].

Hypodermella laricis Tub.: needle cast, rouge: on *L.* sp. NB 50:115, F53:24; on 2 Ont, 4 BC [236]; on 4 BC 39:98, F52:147, [1198]; for distribution of a severe outbreak, see F52:154, and records of other severe outbreaks, F54:130, F55:103.

Lachnella hahniana Seav.: on dead branches of 4 BC F52:152; see *Pinus*.

Lachnellula chrysophthalma (Pers. ex Karst.) Karst.: on dead branches of 4 BC F53:156.

Lenzites abietina (Bull. ex Fr.) Fr.: on stump of 2 NS; may well be *L. saepiaria* [1138].

L. saepiaria (Wulf. ex Fr.) Fr.: cause of a brown rot of dead standing 2 Alaska [555]; from 2 Ont F55:62.

Lophium mytilinum (Pers.) Fr.: on bark of 2 Man [93, p. 43].

Lophodermium laricinum Duby: on 2 Ont Que [236].

L. macrosporum (Hartig) Rehm: on 3 Alta F62:102, [cf. 236].

Melampsora medusae Thüm.: needle rust, rouille des aiguilles: 0 I on 2 BC F59:110, Que 34:103, NS [15, p. 51; cf. 1138]; on 4 BC [1203].

M. paradoxa Diet. & Holw. in Diet. (*M. bigelowii* Thüm.): needle rust, rouille des aiguilles: 0 I on 2, 3 Alta [15, p. 54]; on 2 Alaska [175], Man [93, p. 63], Que F58:37, NS 53:107, [1138]; on 4 BC 49:96, 53:107, [1198, 1202].

Melampsoridium betulinum (Fr.) Kleb.: 0 I on 2 still unrecorded in Canada [cf. 15, p. 22].

Merulius himantoides Fr.: brown cubical rot, carie brune cubique: from 2 NB NS F53:22; see *Abies*.

Odontia bicolor (Alb. & Schw. ex Fr.) Qué.: white stringy rot, carie blanche filandreuse: from 2 NB NS F53:22; on 6 BC F62:122.

Oidiodendron tenuissimum (Pk.) Hughes: on 2 Sask; several other species are reported from peat soil in Ont [54].

Peniophora pallidula (Bres.) Bres. (*P. alutaria* Burt.): on 2 Man [93, p. 77]; see *Abies*.

Physalospora laricis Wehm.: on 2 NS [1138].

Polyporus abietinus Dicks. ex Fr.: pitted sap rot, carie blanche de l'aubier: from 2 Alaska [555], Ont F55:62 Que [791]; on 4 BC [1198].

P. schweinitzii Fr.: brown cubical rot, carie brune cubique: on 4 BC [1198].

P. tomentosus Fr.: on 2 Ont F56:57.

P. versicolor L. ex Fr.: on 2 NB NS and/or PEI [1138].

Poria weirii Murr.: yellow ring rot, carie jaune annelée: from 4 BC F52:145, [1203].

Retinocylus abietis (Crouan) Groves & Wells: leader dieback, dépérissement de la flèche: from 2 BC Alta Sask Man [383, p. 870].

Septogloeum gillii Ellis: on *Arceuthobium campylopodum* (q.v.) on 4 BC [570].

Stereum chailletii (Pers. ex Fr.) Fr.: white stringy rot, carie blanche filandreuse: from 4 BC F58:102, [1203]; see *Abies*.

S. sanguinolentum (Alb. & Schw. ex Fr.) Fr.: red heart-rot, carie rouge du sapin: common on broken tops of 2 injured in the 1956 ice storm NB F58:25; from 4 BC F58:102, [1203].

Trametes tenuis Karst.: causes a brown rot of old logs of 2 Alaska [555].

Tympanis laricina (Fckl.) Sacc.: on 2 Ont [372], Sask F53:108; on 1 cult., 4 BC F57:86, [1199].

Lathyrus L.

LEGUMINOSAE

Annual or perennial herbs of the northern hemisphere and S. America; some grown for ornament and some for food and forage.

1. *L. japonicus* Willd. (*L. maritimus* Bigel), beach pea, pois de mer, and its numerous varieties. On shores of the sea and the larger fresh-water lakes, Greenl, Labr and Nfld to Alaska and south; also in Eurasia.
2. *L. latifolius* L., everlasting or perennial pea, pois vivace; introduced from Europe and escaped from cult. in the US.
3. *L. nuttallii* Wats.; in Canada in BC.
4. *L. ochroleucus* Hook., yellow pea; in Canada from Que to BC.
5. *L. odoratus* L. sweet pea, pois de senteur; introduced from s. Europe. An annual occurring in many cultivars; widely grown for its attractive flowers.
6. *L. palustris* L., vetchling, pois des marais; in NS and from Que to Alaska and s. into the US. 6a, *L. p.* var. *myrtifolius* (Muhl.) Gray (*L. m.* Muhl.); in Canada in Que and Ont.
7. *L. sylvestris* L., flat pea; in Canada in Que; introduced from Europe.
8. *L. venosus* Muhl., cattle pea; apparently represented in Canada by *L. v.* var. *intonsus* Butt. & St. John; from Que and Ont to Sask.

Ascochyta lathyri Trail: leaf spot, tache ascochytiq: on 5 BC 32:96.

A. pisi Lib.: leaf spot, ascochytose: on 2 Que 57:127; on 5 NS [1138]; on 6, 7 BC [535]; on 7 BC 41:94.

Botrytis cinerea Pers.: gray mold, moisissure grise: on 5 Alaska [175]; cause of a pod blight of 5 NS 43:110, [1138].

Cercospora lathyri Dearn. & House: on 8 Ont [93, p. 114].

Corynebacterium fascians (Tilf.) Dowson: fasciation, fasciation: on 5 Man 52:115, ? PEI 43:110. The disease was produced experimentally on 5 with an isolate from *Gladiolus* (q.v.), 50:124.

Erwinia lathyri (Manns & Taub.) Holland (*Bacillus l.* Manns & Taub.): streak, rayure bactérienne: on 5 Alta 32:96, Man [93, p. 28], 53:118, Ont 49:106, Que 24:56, PEI 37:84, [1138]; sometimes severe

Lathyrus

- Alta 43:100, PEI 44:111; diagnosis has been based on symptoms except in Ont 49:106. Some records of streak in the Survey were attributed to virus infection, e.g., Sask 38:104, but without experimental evidence. In England a sweet pea streak virus has been reported, but is poorly characterized [1032].
- Erysiphe polygoni* DC. ex Mérat: powdery mildew, blanc: on 1, 6 Alaska [175]; on 4 BC [50]; on 5, 8 Sask Man [93, p. 44]; on 5 Que 61:114, NS [1138], PEI 25:75, 30:92.
- Fusarium* spp., including *F. lathyr* Taub.: root rot or wilt, pourridié fusarien: on 5 Alta-Que NS PEI 24:56, 25:75, 29:71, 32:96, 37:84; most troublesome where plants were grown year after year in the same soil. Isolations from diseased basal parts or roots of 5 in Man yielded: *F. equiseti* (Cda.) Sacc., *F. solani* (Mart.) App. & Wr., 32:96; *F. oxysporum* Schlecht, 44:41; *F. o.* var. *redolens* (Wr.) Gordon [335]; from 8, *F. sporotrichioides* Sherb. [335].
- Glomerella cingulata* (Stonem.) Spauld. & Schrenk: anthracnose, anthracnose: on 5 Ont 43:110.
- Leptosphaeria doliolum* (Pers.) de Not.: on dead stems of 8 Sask [93, p. 54].
- Microsphaera diffusa* Cke. & Pk.: powdery mildew, blanc: ? on 5 Sask Man [93, p. 44]; on 5 Que 31:101, NB 29:72, PEI 32:96. Probably most of these records are based on the oidial state and thus it is uncertain which powdery mildew was present.
- M. penicillata* (Wallr. ex Fr.) Lévl. (*M. alni* (Wallr.) Salm.): powdery mildew, blanc: on 4 Alta Sask Ont, fide DAOM.
- Mycosphaerella pinodes* (Berk. & Blox.) Vesterg.: on 1 Alaska [1038].
- M. tassiana* (de Not.) Johans.: on 5 BC [50].
- M. tulasnei* (Jancz.) Lindau: on 1 Alaska [1038].
- Peronospora lathyr-palustris* Gäum.: downy mildew, mildiou: on 1 Alaska [1038]; on 3 BC 44:111, [535].
- Phoma herbarum* West.: on 1 Greenl [900].
- Pleospora herbarum* (Fr.) Rabh.: on stems of 1 NS [1138].
- Pythium* sp.: damping-off, fonte: on 5 PEI 37:85.
- P. ultimum* Trow: root rot, pourridié pythien: on 5 Sask 50:127.
- Ramularia deusta* (Fckl.) Baker, Snyder & Davis (*R. roseola* Bubák & Vleugel): on 1 Alaska [175].
- R. deusta* f. *odorata* (Fckl.) Baker, Snyder & Davis (*Cladosporium album* Dowson): white mold, moisissure blanche: on 5 BC 31:101, Ont 45:115. *Erothrothea multiformis* Martin & Charles, an ascomycete, has proved to be unconnected with this fungus [46, 328]; for synonymy see 47:111, 50:127, 52:116, [46].
- Rhizoctonia solani* Kühn: root rot, rhizoctone commun: on 5 Sask 32:96, Man [93, p. 125], PEI 37:85, [1138]; with *Fusarium* spp. NB 41:94.
- Septoria astragali* Rob. & Desm.: on 1 Man, 4, 8 Sask Man [93, p. 137]; on 4 BC [535].
- S. lathyr* Desm.: on *L.* sp. BC [1199].
- Thecaphora deformans* Dur. & Mont.: on 4 Alta [957].
- Thielaviopsis basicola* (Berk. & Br.) Ferr.: black root rot, pourridié noir: from 5 affected by root rot Sask 32:96, 42:101, NS 29:72, 53:119, [1138].
- Uromyces fabae* (Grev.) de Bary: rust, rouille: 0 I II III on *L.* sp., 1 Alaska [175]; on 3 BC [535, 1198]; on 4 Alta Man Ont, 6a Ont [15, p. 242]; on 6 BC [1198], 0 I on 4 Sask Man, 8 Sask, II III on 4 Sask, 8 Alta Sask Man [93, p. 72]. The rust on 8 in Man was shown to be self-sterile and interfertile, but tending to short cycle by producing II or both I and II on the sporidial infections [139].
- Verticillium albo-atrum* Reinke & Berth: wilt, flétrissure verticillienne: on 5 NS 37:85, [1138].
- ?Pea mosaic virus: mosaic, mosaïque: on 5 BC Ont-PEI 24:56; 38:104, 43:110, 57:127; on 8 Man 33:114.
- Bud drop, chute des boutons: excess nitrogen, excès d'azote: Sask 42:101, Ont 48:110, Que 47:111, NB 29:72, PEI 33:74, 44:111.
- Oedema, œdème: on leaves of 2 Ont 44:111.

Lavandula L.

LABIATAE

Perennial herbs, subshrubs or shrubs of the Canary Islands to India.

1. *L. officinalis* Chix, lavender, lavande; native to the Mediterranean region; cult. from ancient times.

Septoria lavandulae Desm: leaf spot, tache des feuilles: on fading leaves of 1 BC [535].

Lavatera L.

MALVACEAE

Herbs, shrubs or trees of the Mediterranean region, Asia, Australia and islands off southern and lower California.

1. *L. trimestris* L., tree mallow, mauve en arbre; native to the Mediterranean region.

Fusarium spp.: crown rot, pourridié fusarien: on ?1 Man 40:94, 41:94; *F. oxysporum* Schlecht. and *F. solani* (Mart.) App. & Wr. were isolated from crown and roots [335].

?Aster yellows virus: aster yellows, jaunisse de l'aster: on *L.* sp. NB 30:86, 31:90.

Ledum L.

ERICACEAE

Evergreen shrubs of the colder regions of the northern hemisphere.

1. *L. glandulosum* Nutt.; in Canada in Alta and BC.
2. *L. groenlandicum* Oeder, Labrador tea, thé du Labrador; in Greenl, Labr, Nfld and from NS to Alaska, and into the US.
3. *L. palustris* L.; n. Eurasia. In N. America represented mainly by 3a, *L. p.* var. *decumbens* Ait. (*L. d.* Lodd); in arctic N. America.

Ascochyta ledi Rostr.: on 2 Greenl [899, p. 570].

Botryosphaeria empetri (Rostr.) Arx & Müller: on 3a Labr [52].

Chrysomyxa ledi de Bary: II III recorded on 1 BC 33:115, [535]; on 1 BC, 2 Mack Que [947]; on 2 BC Sask Ont NS [15, p. 35], Sask Man [93, p. 62], Que 33:115, NS [1138]; on 2, 3 Greenl [899], but probably in part *C. ledicola*.

C. ledi var. *glandulosi* Savile: II III on 1 BC [955, p. 489; 1198].

Chrysomyxa ledi var. *groenlandici* Savile: rust, rouille de l'épinette: II III on 2 BC Mack Alta Ont Que Nfld [955, p. 490]; on 2 BC [1198].

C. ledi var. *ledi*: on 3 Mack [955].

C. ledicola Lagerh.: rust, rouille de l'épinette: II III on 2 Alaska Yukon BC Alta Sask Man NS, 3a Alaska Labr [15, p. 34]; on 2, 3a Alaska [175]; on 2 Mack Man Que, 3a Yukon Mack Frank Keew Man Que [947]; on 2 NS PEI [1198], Nfld [955], [cf. 93, p. 62].

C. woronini Tranz.: rust, rouille de l'épinette: on *L.* spp. Alaska Yukon BC F60:110; III systematic but not perennial on 2 Nfld, 3a Alaska [955]; on 3a Yukon 49:96, [947].

Elsinoë ledi (Pk.) Zeller: on 2 Alaska [983], Man [93, p. 47].

Exobasidium vaccinii Wor. (*E. ledi* Karst.): on 2, 3 Alaska [175]; on 2 Sask [93, p. 77].

E. affin. vaccinii: on 2 Alta [968].

E. vaccinii-uliginosi Bond.: on 2 Que Nfld [968].

Gibbera cassandrae (Pk.) Barr (*Venturia c. Pk.*): on 2 BC [50].

Gloeosporium ledi Schroet.: on 2 Que 32:103.

Hypoderma commune (Fr.) Duby: on 2 Greenl [899].

Lophodermium sphaerioides (Fr.) Duby: on *L.* sp. Alaska [175]; common on fallen needles of 2 Man [93, p. 43]; on 2 Greenl [899]; on 3 Greenl [900].

Phoma herbarum West.: on 3 Greenl [900].

Phyllosticta ledi Rostr.: on 2 Greenl [900, p. 623].

Sporocybe sp.: on 2 Alaska [175].

Synchytrium vaccinii Thomas: on 2 NS [1138].

Leontodon L.

COMPOSITAE

Low stemless perennials native to the Old World.

1. *L. autumnalis* L. (*Apargia a.* (L.) Hoffm.), fall dandelion, or August flower, liondent d'automne, ou pissenlit; in Canada a common weed in the Atlantic Provinces and present in Que and Ont; native to Eurasia and w. Africa, probably introduced from Europe.

Heteropatella umbilicata (Pers. ex Fr.) Jaap (*Septoria cercosperma* Rostr.): on 1 Greenl [900].

Meloidogyne sp. (*Caconema radiculicola* (Greef) Cobb.): root-knot nematode, nodosité des racines: on 1 in greenhouse BC 32:110.

Phomopsis albicans Syd.: on peduncles of 1 NS [1138].

Puccinia hieracii (Röhling) Mart.: on 1 NS [15, p. 351], PEI 30:97, NS PEI ?NB [1138].

Aster yellows virus: aster yellows, jaunisse de l'aster: on 1 NB 31:132, NS 30:97; a common perennial host of the virus in the Maritime Provinces.

Leersia Sw.

GRAMINEAE

Perennial grasses of tropical and temperate regions.

1. *L. oryzoides* (L.) Sw., cutgrass, aspérelle; in Canada from Que to BC.

Drechslera tritici-repentis (Died.) Shoem.: on 1 Ont [993].

Lepidium L.

CRUCIFERAE

Herbs of the temperate and warm regions; some are weedy plants and one is grown for salad and garnishing.

1. *L. bourgeauanum* Thell. (*L. fletcheri* Rydb.); in Canada in Sask and Man, spreading into e. Que.
2. *L. densiflorum* Schrad. (*L. apetalum* auct. non Willd.), pepper grass, passeraie; native to N. America; a very common weed in Canada, especially in the west.
3. *L. sativum* L., garden cress, cresson alénois; native to w. Asia, escaped from cult. in Canada from NS to Que.
4. *L. virginicum* L., poor man's pepper, cresson savane; a native weedy plant widely distributed in Canada.

Albugo cruciferarum S. F. Gray (*A. candida* (Pers. ex Lév.) O. Kuntze, *Cystopus candidus* (Pers. ex Lév.) de Bary): white rust, albugine: on 2 Sask Man [93, p. 29]; on 3 Sask 38:32.

Fusarium oxysporum Schlecht.: from apparently healthy roots of 2 Man [335].

Peronospora parasitica (Pers. ex Fr.) Fr. (*P. lepidii* (McAlpine) Wilson, *P. lepidii-sativi* Gäum., *P. lepidii-virginici* Gäum.): downy mildew, mildiou: on 2 Sask 30:97; on 2, 3 Sask Man [93, p. 30].

Plasmodiophora brassicae Wor.: clubroot, hernie: 3, 4 experimentally infected PEI 37:49, [cf. 1138].

Puccinia aristidae Tracy: 0 I on ?I Sask [93, p. 66].

Rhizoctonia solani Kühn: foot rot, pourriture du pied: on 3 in greenhouse Ont 40:35.

Septoria ?lepidiicola Ell. & Martin: on 2 Man [93, p. 138].

Leptarrhena R.Br.

SAXIFRAGACEAE

Perennial herbs, probably only a single species.

1. *L. pyrifolia* (D. Don.) Ser.; in Alaska, BC and s. into the US, also in n.e. Asia.

Laestadia saxifragae Sacc. & Scalia: on 1 Alaska [1038].

Phyalospora sp.: on 1 Alaska [1038].

Lespedeza Michx.

LEGUMINOSAE

Herbs or shrubs of N. America, e. Asia and Australia.

1. *L. capitata* Michx.; in Canada in s.w. Que and s. Ont.
2. *L. hirta* (L.) Hornem.; in Canada in s. Ont.
3. *L. intermedia* (Wats.) Britt; in Canada in s. Ont.

Botrytis cinerea Pers.: on *L.* sp. NS [1138].

Uromyces lespedezae-procumbentis (Schw.) Curt.: on 1 Ont [15, p. 242]; on 1, 2, 3 Ont, but only the II

Lespedeza

and III stages of this eu-autoecious rust were found [828].

Lesquerella Wats.

CRUCIFERAE

Low annual or perennial herbs mainly of w. N. America.

1. *L. arctica* (Wormskj.) Wats. (*Vesicaria* s. (Wormskj.) Richards.); arctic Alaska, Mack, Frank, Greenl, Labr and Nfld, s. to Alta, Man and Que; also in e. Asia.

Coniothyrium lesquerellae Lind: on 1 Green [601, p. 161; 603].

Mycosphaerella tassiana (de Not.) Johans.: on 1 Frank [604], Greenl [602].

M. tassiana var. *tassiana*: on 1 Frank [52].

Pleospora ambigua (Berl. & Bres.) Wehm.: on 1 Frank [52].

P. cerastii Oud. (*Pyrenophora* c. (Oud.) Lind): on 1 Greenl [603].

P. comata Auersw. & Niessl: on 1 Frank [52].

P. herbarum (Fr.) Rabh.: on 1 Mack [250], Frank [52].

P. penicillus (Schm.) Fckl. var. *p.* (*Pyrenophora chrysospora* (Niessl) Sacc.): on 1 Greenl [601, 603].

P. phaeocomoides (Berk. & Br.) Wint. var. *infectoria* (Fckl.) Wehm. (*P. i.* Fckl.): on 1 Greenl [603].

P. setigera Niessl (*Pyrenophora* s. (Niessl) Sacc.): on 1 Greenl [603].

Puccinia cruciferarum Rud. (*Micropuccinia* c. (Rud.) Rostr. 1904, Arth. & Jacks. in Arth. 1921): III on 1 Greenl [902, p. 114]; doubtful.

Lewisia Pursh

PORTULACACEAE

Fleshy perennial herbs of w. N. America, planted in rock gardens.

1. *L. rediviva* Pursh, bitter root, racine amère; in BC and south.

Uromyces unitus Pk. ssp. *unitus* (rather than *U. u.* ssp. *spragueae* (Harkn.) Savile, *U. s.* Harkn.): rust, rouille: III on 1 s. Okanagan Valley and introduced on Vancouver I., BC 33:115, 34:91, [970].

Liatris L.

COMPOSITAE

Perennial herbs of N. America.

1. *L. aspera* Michx.; in Canada in s.w. Ont.
2. *L. cylindrica* Michx.; in Canada in s. Ont.
3. *L. ligulistylis* (Nels.) K.Schum.; in Canada from Alta to Man.
4. *L. punctata* Hook.; in Canada from Alta to Man.

Puccinia liatridis (Arth. & Fromme) Bethel ex Arth.: 0 I on 1 (?) Sask Man, 3, 4 Sask [93, p. 69]; on 1, 2 Ont [828]; on 4 Sask [15, p. 146].

Sclerotinia sclerotiorum (Lib.) de Bary: from *L.* sp. Alta 50:127.

Septoria liatridis Ell. & Davis: on 1 Man [93, p. 138].

Ligularia Cass.

COMPOSITAE

Perennial herbs of w. Europe to e. Asia.

Aphelenchoides fragariae (Ritz.-Bos) Christie (*A. ritzema-bosi* (Schwartz) Steiner & Buhrer): on *L.* sp. Que 50:127.

Botrytis cinerea Pers.: on *L.* sp. Alaska [175].

Ligusticum L.

UMBELLIFERAE

Perennial herbs of temperate and cold regions.

1. *L. apiifolium* (Nutt.) Gray; in w. Wash and Oregon and presumably BC.
2. *L. hultenii* Fern.; from e. Asia, Alaska and s. to BC.
3. *L. scothicum* L. (*Haloscias* s. (L.) Fries), Scotch lovage, persil de mer; from Greenl to Labr. and south.

Aecidium ligustici Ell. & Ev.: 0 I on 3 Que [15, p. 386].

Heterosphaeria patella (Tode) Grev.: on 3 Greenl [900].

Phoma complanata (Tode ex Fr.) Desm.: on 3 Greenl [900].

Plasmopara nivea (Ung.) Schroet.: on *L.* sp., 2 Alaska [175].

Puccinia ligustici Ell. & Ev.: on 1 BC [15, p. 281]; on 3 Que [828].

Ramularia reticulata Ell. & Ev.: on ?*L.* sp. Alaska [175].

Septoria levistici Westd. (*S. ligustici* Guba): on 3 NS [956].

Ligustrum L.

OLEACEAE

Deciduous or evergreen shrubs or rarely trees, mainly of e. Asia and Malaysia to Australia, one in Europe and n. Africa; mostly grown for their handsome foliage.

1. *L. amurense* Cass., Amur privet; native to n. China; naturalized in Va.
2. *L. vulgare* L., common privet, troène; native to Europe and n. Africa; naturalized in e. N. America, including s. Ont; cult. from ancient times.

Agrobacterium tumefaciens (Sm. & Towns.) Conn: crown gall, tumeur du collet: on 1 NB 55:116.

Cercospora howittii Dearn. inedit.: leaf spot, tache des feuilles: on 2 BC 41:94, [535], Ont 40:94.

Glomerella cingulata (Stonem.) Spauld. & Schrenk: anthracnose, anthracnose: on 2 Ont 48:110, 57:118.

Microsphaera penicillata (Wallr. ex Fr.) Lév. (*M. alni* (Wallr.) Salm.): powdery mildew, blanc: on 2 Ont PEI 38:104, NB 44:111, [cf. 1138].

Nectria cinnabarina Tode ex Fr.: destroyed a hedge of 1, apparently already weakened by winter injury, NS 52:104.

Winter injury: destroyed many hedges of 2 in the severe winter of 1942-43, BC 43:110.

Lilium L.

LILIACEAE

Attractive plants of the temperate regions of the northern hemisphere; several species are commonly grown in gardens and others appear in special collections.

1. *L. auratum* Lindl., gold-stripe lily, lis doré; Japan.
2. *L. canadense* L., meadow lily, lis sauvage; in Canada from NS to Que.
3. *L. candidum* L., Madonna lily, lis blanc; s. Europe and s.w. Asia.
4. *L. columbianum* Hanson (*L. parviflorum* Hook.) Holz.), wild tiger lily; BC to Calif.
5. \times *L. imperiale* Wils. (*L. princeps* Wils., *L. regale* \times *L. sargentiae* Wils.).
6. *L. longiflorum* Thunb., white trumpet lily, lis jama-juri; Japan. 6a, *L. l.* var. *eximium* Baker; easter or Bermuda lily.
7. *L. martagon* L. \times *L. hansonii* Leicht.
8. *L. michiganense* Farwell; in Canada in s. Ont.
9. *L. monodelphum* Bieb., Caucasian lily; Caucasus to Iran.
10. *L. pardalinum* Kellogg, leopard lily; Calif.
11. *L. philadelphicum* L., orange cup lily, lis de Philadelphie; e. US and in s. Ont and Que. 11a, *L. p.* var. *andinum* (Nutt.) Ker, in Canada from w. Que to BC.
12. *L. pumilum* DC (*L. tenuifolium* Fisch.); e. Asia.
13. *L. regale* Wils., regal lily; w. China.
14. *L. speciosum* Thunb.; Japan.
15. *L. superbum* L., Turk's-cap lily; e. US and into ?Ont.
16. *L. tigrinum* Ker, tiger lily, martagon; e. Asia and naturalized in the US.

Aphelenchoides olesistus (Ritz.-Bos) Steiner, non *A. ritzema-bosi*: bunchy top: on 6 cult. in greenhouse BC 47:111, 49:109, [535].

Botrytis cinerea Pers. (stat. conid. of *Botryotinia fuckeliana* (de Bary) Whetz.): gray mold, moisissure grise: on *L. spp.* cult. BC Ont [963], Man [93, p. 113], NS 30:89.

B. elliptica (Berk.) Curt.: blight, brûlure botrytique: on *L. spp.* BC Alta Man Ont Que NS PEI. Recorded almost every year since 1932, particularly in BC; affects many species of lily, 32:91, 39:105; the level of infection differs with the host species [cf. 93, p. 113; 535; 1138].

Cercospora inconspicua (Wint.) Höhn.: leaf spot, tache ovale: on 2 Que 39:89; on 7 Man 45:115; on 11a Alta [963].

?*Corynebacterium fascians* (Tilf.) Dowson: fasciation, fasciation: on 14 BC 47:112, [cf. 535].

Cylindrocarpon radicola Wr.: root rot, chancre des racines: on 6 Ont 35:69.

Fusarium spp.: *F. oxysporum* Schlecht. and *Botrytis elliptica* from stems of 6a Man, *F. o. f. lilii* Imle from bulbels of 6 affected by a basal rot of the scales BC [335].

Fusarium spp., etc.: on *L. sp.* Alta 47:111, Sask 56:128. *Phyllosticta lilii* Ell. & Dearn.: leaf spot, tache des feuilles: on 13 Que 58:117.

Phytophthora parasitica Dastur: stump rot, mildiou: on 12, 13 Ont 47:111; *P. sp.* on *L. sp.* Ont 55:119.

Puccinia sporoboli Arth.: rust, rouille du sporobole: 0 I on 5 Man 39:105; on 11a Sask [93, p. 71; cf. 15, p. 138].

Uromyces holwayi Lagerh.: rust, rouille: 0 I II III on *L. sp.* hybrid, 2, 15 Ont, 4, 10 BC, 11 Que [963]; also on *L. spp.* BC 40:95; on 2 Que 49:107; on 6 BC [535]; on 8 Ont [15, p. 227; cf. 828].

Vermicularia liliacearum West. [*Colletotrichum dematium* (Pers. ex Fr.) Grove]: on stems of *L. sp.* NS [1138].

?Lily latent virus and cucumber mosaic virus: suggested as the cause of a necrotic fleck, moucheture nécrotique, observed on 3 BC 52:116.

Lily mosaic virus (strain of cucumber mosaic virus [1032]): mosaic, mosaïque: on *L. sp.* Alta 44:111; on 1 BC 32:91; on 2 Que 47:112; on 6a Ont 36:78; on 11, 16 Man 45:116; on 13 NS 55:124.

?Lily rosette virus: rosette, rosette: on ?9 Que 52:116.

Limonium Mill.

PLUMBAGINACEAE

Perennial or sometimes annual herbs of wide distribution; a number are cult.

1. *L. latifolium* (Sm.) Kuntze; native to s.e. Europe.
2. *L. nashii* Small, formerly included in *L. carolinianum* (Walt.) Britt., sea heather, lavande de mer; in Canada in Nfld, PEI and from NS to Que.
3. *L. sinuatum* (L.) Mill.; native to the Mediterranean region.
4. *L. vulgare* Mill., sea lavender, immortelle blue; native to Europe, n. Africa and Asia Minor.

Botrytis ?cinerea Pers: gray mold, moisissure grise: associated with blossom blight and dieback of *L. sp.*, BC 44:111.

Cercospora insulana Sacc.: leaf spot, tache des feuilles: on 3 Man 38:108, 41:94.

Fusarium spp.: foot rot, pourriture du pied: on 3 Man 38:108; *F. oxysporum* Schlecht. var. *redolens* (Wr.) Gordon isolated [335]; also from 3, *F. oxysporum*, Man 1941 [335].

Uromyces limonii (DC.) Lév.: rust, rouille: 0 I II III on 1 BC 45:16, [968], Ont, as *U. armeriae*, 42:102; on 4 Ont 48:110, [968].

U. limonii-caroliniani Savile & Connors: 0 I III on 2 Que NB NS [968, p. 193]; on 2, as *U. limonii*, NB NS [15, p. 252], PEI 30:97, [cf. 1138, p. 55].

?Aster yellows virus: aster yellows, jaunisse de l'aster: on *L. sp.* NB 33:74; on 1 Man 38:108.

Linaria Mill.

SCROPHULARIACEAE

Perennial or annual herbs of the temperate regions of the northern hemisphere; some grown in flower gardens and a few have become weeds.

1. *L. dalmatica* (L.) Mill., broad-leaved toad-flax; introduced from s.e. Europe and now adventive in Canada, especially Sask.

Linaria

2. *L. purpurea* (L.) Mill., purple toadflax, gueule de lion; Europe.
3. *L. vulgaris* Mill., toadflax or butter-and-eggs, linaires vulgaires; introduced from Eurasia, probably as an ornamental, and now in all provinces of Canada and into the Northwest Territories.

Colletotrichum vermicularioides Halst. [*C. gloeosporioides* Penz.]: stem blight, anthracnose: on 2, 3 Ont 44:111.

Entyloma linariae Schroet.: on 3 Ont [292].

Sclerotinia ?sclerotiorum (Lib.) de Bary: wilt, flétrissure sclérotique: on *L. sp.* Alta 37:85.

Aster yellows virus: aster yellows, jaunisse de l'aster: on *L. sp. cult.* NS 60:99; on 3 Ont 30:97.

Linnaea Gronov.

CAPRIFOLIACEAE

A slender creeping and trailing circumboreal evergreen plant.

1. *L. borealis* L., twin-flower; in n. Eurasia and Alaska. 1a, *L. b. var. americana* (Forbes) Rehd. (*L. b. ssp. a* (Forbes) Hult.); from Greenl, Labr, Nfld and NS to Alaska. 1b, *L. b. ssp. longifolia* (Torr.) Hult.; Alaska south to Calif.

Ceratobasidium anceps (Bres. & Syd.) Jackson: on 1a Ont [495].

Gibbera dickiei (Berk. & Br.) Arx (*Venturia d.* (B. & Br.) de Not.): on 1a BC [50], Man Ont [93, p. 56], Que [53].

Halbaniella (Asteridium) linnaeae Dearn.: on leaves of 1a Man [93, p. 47].

Mycosphaerella minor (Karst.) Johans. (*Sphaerella m.* Karst.): on 1 Greenl [899].

Phyllachora wittrockii (Erikss.) Sacc.: on 1a NS [1138]; on 1b Alaska [175].

Linum L.

LINACEAE

Annual or perennial herbs of the temperate and warm regions; several cult. for ornament and one for its fiber and oil.

1. *L. grandiflorum* Desf., flowering flax, lin rouge; introduced from n. Africa; locally escaped from gardens.
2. *L. lepagei* Boivin; shores of Hudson Bay, Man and Ont.
3. *L. lewisii* Pursh, prairie flax; from n. Ont to BC and Alaska, s. to Mexico.
4. *L. perenne* L., fairy flax, lin vivace; native to Europe.
5. *L. rigidum* Pursh; Man to Alta, s. to Texas.
6. *L. usitatissimum* L., common flax, lin; introduced from Europe; widely cult. in the Prairie Provinces.

Other host: 7, *L. monogynum* Forst.f. (may be *L. angustifolium* Huds.).

Alternaria linicola Groves & Skolko: brown stem blight, alternariose: first detected in isolations from seed of 6 Alta Sask Man Ont 44:27, [380], and then in the field Sask 48:23 et seq.; also one of the fungi associated with III of *Melampsora lini*, 52:32. There is some evidence that heavy infection of the seed reduced germination, 54:41. Although unrecorded in the field from Man, the symptoms of head discoloration attributed to *A. sp.* are suggestive, 42:25. A seedling-blight stage was also recorded in Sask 51:28.

A. tenuis auct. sensu Wiltshire: common on discolored stems of 6 but has never proved pathogenic Sask 52:32, Man 45:35.

Bipolaris sorokiniana (Sacc. in Sorok.) Shoem. (*Helminthosporium sativum* Pamm., King & Bakke): from diseased plants of 6 Sask 50:35, Man 40:23.

Botrytis cinerea Pers.: from brown discolorations of 6 Que 43:23.

Colletotrichum lini (Westerdyk) Tochinai (*C. linicola* Pethyb. & Laff.): anthracnose, anthracnose: on 6 Alta Sask 42:24, Man Ont 45:32; from dead seedlings Man 47:31. The seed-borne pathogens *C. lini* and *Polyspora lini* (q.v.) were inactivated to a marked degree when infested seed was sown in natural soil in Alta. This is attributed to the antibiotic action of microorganisms in the soil [437]. However, when the experiment, somewhat modified, was repeated in Que, the results were less striking [577].

Coniothyrium olivaceum Bon.: seedling blight and leaf spot, brûlure des plantules et tache coniothyrienne: on 6 Sask in 1945, 46:23. Also experimentally infected 1; a minor seed-borne pathogen [1106].

Cuscuta gronovii Willd.: dodder, cuscute: on 6 Man 44:27.

Fungi from seed: of 6: *Alternaria linicola* Groves & Skolko, Alta-Ont [380]. *Ascochyta linicola* Naum. & Vassil., Ont; *Aspergillus nidulans* (Eidam) Wint., Que; *A. niger* van Teigh., Sask; *Aureobasidium pullulans* (de Bary) Arn., Que [374]. *Bipolaris sorokiniana* (Sacc. in Sorok.) Shoem., Sask 42:24. *Botrytis cinerea* Pers., Sask 51:28. *Chaetomium cochliodes* Pall., Sask Que; *C. dolichotrichum* Ames, Que; *C. funicola* Cke., Ont; *C. globosum* Kze., *C. indicum* Cda., Que; *C. murorum* Cda., Man; *Cladosporium cladosporioides* (Fres.) De Vries, Man Ont; *C. herbarum* Lk., Alta Sask Que; *C. malorum* Ruehle, Sask; *Colletotrichum lini* (Westerdyk) Tochinai, Ont Mich; *Cunninghamella echinulata* Thaxt., Sask; *C. elegans* Lendner, Sask Man Ont; *Curvularia geniculata* (Tracy & Earle) Boed., *C. inaequalis* (Shear) Boed., Que; *Dactylium dendroides* Fr., Ont; *Epicoccum nigrum* Lk., Man [374]. *Fusarium acuminatum* Ell. & Ev., *F. culmorum* (W.G.Sm.) Sacc., Sask; *F. avenaceum* (Fr.) Sacc., Ont Que; *F. equiseti* (Cda.) Sacc., *F. oxysporum* Schlecht., Ont; *F. oxysporum f. lini* (Bolley) Snyder & Hansen, Sask; *F. graminearum* Schwabe, Que; *F. poae* (Pk.) Wr., Ont [334]. *Gelasinospora cerealis* Dowding, Man; *Gonatobotrys simplex* Cda., *Helminthosporium linicola* Kletschett, Que; *Melanospora papillata* Hotson, *M. zambiae* Cda., Ont; *Mucor hiemalis* Wehmer, Ont; *M. spinosus* van Teigh., Sask; *Oospora lactis* Fres., *Paecilomyces varioti* Bain., *Papularia arundinis* (Cda.) Fr., Ont; *Patella abundans* (Karst.) Seav., Man; *Penicillium cyclopium* Westling, Sask; *Periconia circinata* (Mangin) Sacc., Ont; *Rhizoctonia solani* Kühn, Que; *Rhizopus tonkinensis* Vuill., Ont; *Rosellinia*

limoniiformis Ell. & Ev., Sask; *Sordaria fimicola* (Rob.) Ces. & de Not., Ont; *Stachybotrys chartarum* (Ehr.) Hughes, Que; *Stemphylium botryosum* Wallr., Ont; *Trichoderma viride* Pers., Ont Que [374].

Fusarium oxysporum Schlecht. f. *lini* (Bolley) Snyder & Hansen (*F. lini* Bolley): wilt, flétrissure fusarienne: on oilseed cultivars of 6 Sask Man Ont 24:7, Alta 28:26, 29:22, ?NB 30:33, and fiber flax Ont Que 37:18; on 1 Sask 43:100. Circumstantial evidence suggests that wilt was widespread and probably destructive in the flax-growing areas in Sask and Man before resistant cultivars were available, 20:17, 50:37, 53:39. Fiber flax cultivars also vary widely in resistance, but, in general, selection for resistance has not progressed as far as it has in oilseed flax. Although bacteria and fungi isolated from the soil where fiber flax had been grown were antagonistic to the wilt organism, they failed to protect the plant through its entire growth when the seed or soil were inoculated with them [581].

Fusarium spp.: from plant parts of 6: *F. oxysporum* f. *lini* from wilted plants, Sask Man Ont Que; other species isolated at the same time were *F. acuminatum*, Man; *F. avenaceum*, Man Que; *F. equiseti*, Sask Que. From diseased basal parts or roots, *F. culmorum*, *F. poae*, Sask; *F. oxysporum*, *F. sambucinum* Fckl. var. *coeruleum* Wr., BC; from blighted seedlings with *Rhizoctonia solani* (q.v.), *F. acuminatum*, Sask Man; *F. o.* var. *redolens* (Wr.) Gordon, Man; from the rhizosphere of wilted plants, *F. solani* (Mart.) App. & Wr., Ont [335].

Melampsora lini (Ehrenb.) Lév.: rust, rouille: 0 I II III on 2 Man Ont 50:34; on 3 Alaska [175], Yukon 50:34, Alta 34:104; Alta Man [15, p. 57], Sask 40:23, Sask Man [93, p. 63], Man 47:31; on 5 Sask [93]; on 6 BC 41:41, Alta-Ont PEI 24:17, Que 43:23, Sask Ont [15].

Over the years rust has been general and sometimes destructive in the flax-growing areas of Sask and Man when the prevailing rust races were able to attack the predominant cultivar. The first epidemic occurred in 1942 when some fields of Bison were severely affected and yields sharply reduced, 43:23, 26. Rust was again epidemic in 1948 when Royal, formerly resistant in the mature-plant stage, was severely damaged, 48:22, 26, and in 1950 when Dakota was heavily rusted Man 50:36. Since 1952-53 in Man and Sask rust has been of no economic importance as the resistant cultivars Sheyenne, Redwood and Rocket came to be grown extensively, 52:33. More recently rust has been heavy in the Peace River district, Alta, where the susceptible Red Wing is grown on account of its early maturity, 56:35. Outbreaks of flax rust depend largely on plentiful local inoculum. The 0 I stages develop early in the season on volunteer plants from overwintered rusted straw, and then the rust spreads to the sown crop Man 43:23, 44:28, Sask 45:29. Losses in the Peace River district will continue as long as a susceptible cultivar is grown in the same or adjacent fields year after year. Under certain conditions, applications of 2,4-D may appreciably increase rust damage Sask 54:50. A race of rust virulent to certain cultivars now being grown in Man is reported [468].

Melampsora lini and *Fusarium* spp.: stem canker, chancre des tiges: Under certain conditions rust lesions on the stem are invaded by *Fusarium* spp. and the stem is girdled Sask Man 42:26, 48:26; so isolated was *F. acuminatum* Man [335]. Although other organisms may be isolated from the lesions, only the fusaria were found to be pathogenic, 59:29.

Mycosphaerella linorum (Wr.) Garcia Rada (stat.

conid. *Septoria linicola* (Speg.) Garass.): pasmo, pasmo: on 6 BC 44:26, Alta 55:42, Sask 46:24, Man 40:24, Ont 39:30. Infection heavy and losses appreciable in Man 47:36, apparently less prevalent in Sask; peak years for infection were 1947 and 1954, 48:23, 55:39. Pasma is of economic importance in Man and e. Sask; cultivars differed in their susceptibility. Heavy infections caused premature ripening and reduced yield of seed and kernel weight, especially in plants inoculated in the flowering stage [912], and also the oil content and iodine number of the oil [915]. Isolated from seed of 6 Man Ont [334].

M. tassiana (de Not.) Johans.: on 3 BC [50].

Olpidium brassicae (Wor.) Dang. (*Asterocystis radialis* de Willd.): from roots of 6 Sask 42:25.

Pellicularia praticola (Kotila) Flentje (*Ceratobasidium p.* (Kotila) L.S.Olive, *Corticium praticola* Kotila: stat. steril. *Rhizoctonia praticola* Saksena & Vaartaja): seedling blight and root rot, brûlure des plantules et pourriture des racines: on seedlings of 6 (as *R. solani*) Alta 57:37, Sask 32:29, Man 38:22, ?Que 44:28; on maturing plants Alta 53:40, Sask 30:34, 43:24, 44:26, Man 48:26, 54:39. When first encountered, the disease was attributed to *R. solani*, but the perfect state of the "flax strains" was obtained fairly consistently on artificial media and it agreed closely with *P. praticola* [430]. Flentje [297, 298] noted that the perfect state of *P. praticola* develops on unsterilized soil, whereas that of *P. filamentosa* (Pat.) Rogers (stat. steril. *R. solani* Kühn) is formed on a plant substrate. The appearance of the two fungi in culture also differs. He states that *P. praticola* is pathogenic to sugar beets and other hosts such as lettuce, tomato, cabbage and dahlia. Probably many records of *R. solani* on these hosts in Canada really concern *P. praticola*.

P. praticola is a major pathogen in seedling blight of flax in Sask [1113]. The disease has been reported repeatedly in Sask, but its level varies with the season; destructive outbreaks recorded were: Sask 43:21, 46:23, Man 47:30, and it may be increasing in importance Sask 57:34. It is apparently worse on summerfallow than on flax or cereal stubble, 47:21, 50:34, 52:31. Nevertheless many isolates from flax are pathogenic to cereals and vice versa, 53:39.

Phoma spp., including *P. exigua* Desm.: basal stem rot, phomose: first observed about 1940, and although highly pathogenic, the weather is evidently too dry and warm in most seasons to favor its development on 6 Sask 45:31, 51:29, 54:41; on 4 Sask 42:102.

Pleospora tragacanthae Rabh.: on 3 BC [50].

Polyspora lini Laff.: browning and stem break, oxychromose: on 6 Alta 26:10, Sask 24:17, Man 45:35, 47:31; Ont 38:22, Que 42:27, PEI 25:19, 42:27. Severe in Sask in 1942, 42:23, when the weather was cool, and in some parts of Sask in other years, 44:25, 48:23, 27; on 1 Sask 44:111, 3 Sask Man 46:26; from seed of 6 Alta 34:22, Sask 42:23, Sask Man Ont and Scotland [374]. First isolations were from stems and leaves of 6 in Sask in 1923 and 1924; and from stem and seed in Alta in 1930; some evidence was obtained of strains of the fungus that differ in pathogenicity and in culture [437]. The fungus was markedly inactivated when infected seed was sown in natural soil [437]. The relative merits of three methods of seed examination were studied [1129].

Pseudomonas atrofaciens (McCull.) F.L.Stev.: from discolored seed of 6 that germinated poorly Man 39:30.

Pythium spp.: associated with seedling blight and root rot, brûlure des semis et pourridié pythien: *P.*

Linum

debaryanum Hesse, *P. megalacanthum* de Bary, Sask 42:22; *P. ultimum* Trow, Sask 49:29; *Pythium* isolated in the early season but later *Pellicularia praticola* predominated 47:28.

Rhizoctonia solani Kühn: although often recorded on 6, the pathogen appears to be mainly *Pellicularia praticola* (q.v.) [cf. 93, p. 126].

Selenophoma linicola Vanterpool: dieback, tache des rameaux: on 6 in 1944, Sask 45:32, 46:24, 47:30, 52:33, 57:35; a distinct species, 46:24.

Aster yellows virus: aster yellows, jaunisse de l'aster: first observed on 6 in Man in 1952, 53:56, and then in Sask 53:40, Alta 54:39, Ont 55:42; on 1 Sask 54:41; on 7 Ont 53:41. Fairly prevalent from 1953 to 1957, a peak year when loss of crop was estimated to be 5% in Sask and 15% in Man, 57:34, 36; again rather conspicuous in Sask in 1961, 62:41.

Boll blight, brûlure des capsules: a physiological disorder, 52:32, similar to blast of oats, 55:39; reported in Man 45:26, Sask 47:32, Alta 48:28.

Chemical injury: caused by 2,4-D, recorded on 6 Sask 45:31, 50:35, 51:29, Alta 58:37; by TCA, Sask 57:35; by chloranil (Sperton) when applied as a seed disinfectant, Que 43:23, 44:29.

Dieback: associated with high air temperatures, recorded on 6 in Sask 46:24, 47:29.

Heat canker, chancre de chaleur: a condition caused by high temperatures at the soil line occurs frequently; recorded on 6 Man Ont 23:35, Sask 31:29, Alta 32:29. It is characterized by a girdling of the stems at the soil line, 41:21, and when the injury is not overly severe, by a swelling of the stems above the injury. In 1947 when dieback (q.v.) was severe in Sask, 47:29, heat canker was severe in Man, 47:32. In 1956, when the crop was exposed to high temperatures in early June, heat canker was prevalent in Sask, 56:32.

Liriodendron L.

MAGNOLIACEAE

Two trees, one of e. N. America and the other of China.

1. *L. tulipifera* L., tulip tree, tulipier; in Canada in s. Ont near L. Erie. The tree is too rare in Canada to be of much economic importance.

Ectostroma liriodendri Kze. ex Fr.: tar spot, tache goudronneuse: on 1 Ont 25:67, 44:100.

Rhytisma liriodendri Wallr.: tar spot, tache goudronneuse: on 1 cult. Que 32:86; but see *Ectostroma* [3].

Trichothecium roseum (Pers.) Lk.: on *L. sp.* Ont F60:67.

Lloydia Salisb.

LILIACEAE

Dwarf bulbous circumpolar herb.

1. *L. serotina* (L.) Reichenb. (*Anthericum serotinum* L.), alp lily; in N. America in the mts. of Alaska, Yukon, BC and Alta.

Pleospora penicillus (Schm.) Fekl. var. *p.* (*P. chrysospora* Niessl, *Pyrenophora c.* (Niessl) Sacc.): on 1 Alaska [175, 604].

P. scrophulariae (Desm.) Höhn.: on 1 Alaska [175, 604].

Puccinia kukkonensis Savile: III on 1 Yukon [963, p. 38].

Lobelia L.

LOBELIACEAE

Annual or perennial mostly herbs occurring in many parts of the world, rather abundant in e. US; cult. in the flower garden and borders.

1. *L. cardinalis* L., cardinal flower, cardinale; in Canada from NB to Ont.
2. *L. erinus* L.; native to s. Africa.
3. *L. inflata* L., Indian tobacco, tabac indien; in Canada from NS to Sask.
4. *L. siphilitica* L., great lobelia or blue cardinal flower; in Canada in s. Ont.

Botrytis cinerea Pers.: on 2 Alaska [175].

Entyloma lobeliae Farl.: on 3 Ont Que [292].

Fusarium sp. and *Sclerotinia ?sclerotiorum* (Lib.) de Bary: associated with root rot and wilt of *L. sp.* Alta 37:79.

Meloidogyne sp. (*Caconema radiculicola* (Greef) Cobb): root-knot nematode, nodosité des racines: on *L. sp.* BC 32:91.

Puccinia lobeliae Gerard ex Pk.: rust, rouille: III on 4 Ont [15, p. 262; cf. 828].

?*Pythium sp.*: damping-off, fonte des semis: on *L. sp.* BC 39:105.

?Aster yellows virus: aster yellows, jaunisse de l'aster: on *L. sp.* NB 35:69.

Cucumber mosaic virus (cucumis virus 1): cucumber mosaic, mosaïque du concombre: on 1 NB 51:115.

Lobularia Desv.

CRUCIFERAE

Low perennials of the Old World.

1. *L. maritima* (L.) Desv., sweet alyssum, corbeille d'argent; native to Europe; often cult. as an annual and reported to be occasionally spontaneous.

Albugo cruciferarum S.F.Gray (*Cystopus candidus* (Pers. ex Lév.) de Bary): white rust, albugine: on 1 NB 41:87.

Fusarium sp.: associated with wilt of 1 Que 57:127.

Peronospora parasitica (Pers. ex Fr.) Fr.: downy mildew, mildiou: on 1 NB 41:87.

Plasmidiophora brassicae Wor.: clubroot, hernie: on 1 Ont 56:53, 128.

Sclerotinia ?sclerotiorum (Lib.) de Bary: associated with wilt of 1 Alta 37:72.

Aster yellows virus (callistephus virus 1): aster yellows, jaunisse de l'aster: on 1 PEI 52:116.

Loiseleuria Desv.

ERICACEAE

A small depressed shrubby circumpolar evergreen.

1. *L. procumbens* (L.) Desv.; Greenl to Alaska, s. to Nfld, NS, Que and Alta.

Mycosphaerella cassiopes Barr (*Sphaerella inconspicua* Schroet.): on 1 Greenl [899].

Phoma herbarum West.: on 1 Greenl [899].

Lolium L.

GRAMINEAE

Annual or perennial grasses of Eurasia and n. Africa.

1. *L. multiflorum* Lam. (*L. italicum* A.Br.), Italian ryegrass, ray-grass italien, ou pill de Bretagne; this annual is cult. as a lawn and meadow grass; naturalized from Europe and a serious weed in s.w. BC.
2. *L. perenne* L., perennial ryegrass, ivraie des champs; cult. as a lawn and meadow grass, naturalized from Europe and persists for a short time in E. Canada and BC.
3. *L. persicum* Bois. & Hoh., darnel; naturalized from Asia and present in W. Canada and Ont.
4. *L. rigidum* Gaud.; used in Canadian records in error for *L. persicum*.
5. *L. temulentum* L., darnel, ivraie; in Canada a nonpersistent weed introduced from Europe; possibly used in records in error for *L. persicum*.

Claviceps purpurea (Fr.) Tul.: ergot, ergot: on 1 BC [535]; on 2 cult. BC 24:18, 34:26, [50, 535, 1034], Ont [172], NB 60:83; on 4 Man 34:104, [1034].

Drechslera siccans (Drechs.) Shoem.: leaf blight, brûlure drechsleréenne: on *L. sp.*, 1, 2 Ont [993]; on 2 cult. Ont 45:43, 46:30; from seed of 2 Ont [374].

Fungi from seed of 2: *Acremoniella atra* (Cda.) Sacc., *Alternaria tenuis* auct. sensu Wiltshire, *Aureobasidium pullulans* (de Bary) Arn., *Bipolaris sorokiniana* (Sacc. in Sorok.) Shoem., *Botrytis cinerea* Pers., *Chaetomium globosum* Kze., Ont; *C. indicum* Cda., Scotland; *Epicoccum neglectum* Desm., *Fusarium arthrosporioides* Sherb., *F. equiseti* (Cda.) Sacc., Ont; *F. culmorum* (W.G.Sm.) Sacc., BC; *F. avenaceum* (Fr.) Sacc., Scotland; *Melanospora papillata* Hotson, *M. zamiae* Cda., *Papularia sphaerosperma* (Pers.) Höhn., Ont [374].

Fusarium equiseti and *F. oxysporum* Schlecht.: from discolored roots and diseased basal parts of 5 Sask [335].

Gloeotinia temulenta (Prill. & Delacr.) Wilson, Noble & Gray: from seed of 2 Scotland; not known from Canada [374].

Puccinia coronata Cda.: crown rot, rouille couronnée: II III on 1, 2 BC [535; cf. 15, p. 152].

P. graminis Pers.: stem rust, rouille de la tige: II III on 1 Man 38:24; on 2 Que 25:20.

Pythium arrhenomanes Drechs.: on 5 Sask 34:7.

Ramularia pusilla Unger (*Ovularia p.* (Ung.) Sacc. & D.Sacc., *O. hordei* (Cav.) Sprague, *O. lolii* Volk.): eye spot, tache ocellée: on 1 cult. BC 34:25, 45:43, [535]; on 2 cult. BC 33:18, 35:22, [535]; on 1, 2 BC [1034, 1039]; apparently fairly common on these grasses.

Rhynchosporium secalis (Oud.) Davis: scald, tache pâle: on *L. sp.* BC 57:49.

Sclerotinia borealis Bubák & Vleugel: snow mold, moisissure nivéale: on 2 cult. BC [377].

Lomatium Raf.

UMBELLIFERAE

Perennial herbs of N. America.

1. *L. ambiguum* (Nutt.) Coult. & Rose, bread-and-biscuit; e. BC and south into the US.
2. *L. dissectum* (Nutt.) Mathias & Constance var. *multifidum* (Nutt.) Mathias & Constance (*Leptotaenia multifida* Nutt.); in Canada in BC and Alta.
3. *L. macrocarpum* (Hook. & Arn.) Coult. & Rose (*Cogswellia macrocarpa* (H. & A.) Jones); in Canada in BC and Man.

Mycosphaerella tassiana (de Not.) Johans.: on 1 BC [50].

Puccinia asperior Ell. & Ev.: 0 I III on 2 BC [1198; cf. 15, p. 318].

P. jonesii Pk.: 0 I III on ?3 BC 31:120, [cf. 15, p. 316].

Lomatogonium A.Br.

GENTIANACEAE

Small annual or biennial plants of boreal regions.

1. *L. rotatum* (L.) Fries (*Pleurogyne rotata* (L.) Griseb.); Greenl, Lab, Nfld and Que to Alaska; also in Eurasia.

Mycosphaerella tassiana (de Not.) Johans. (*Sphaerella pachyasca* Rostr.): on 1 Greenl [899].

Lonicera L.

CAPRIFOLIACEAE

Shrubs of the northern hemisphere in N. America and Eurasia to Java.

1. \times *L. bella* Zobel (*L. morrowii* \times *L. tatarica*), honeysuckle; escaped from cult. in the US.
2. *L. canadensis* Bertr., fly-honeysuckle; in Canada in NS and from Que to Sask.
3. *L. ciliosa* Poir.; from BC to Calif.
4. *L. coerulea* L., fly-honeysuckle; from n. and central Europe to Japan.
5. *L. dioica* L.; in Canada from s.w. Que to Man; passing freely into 5a, *L. d.* var. *glaucescens* (Rydb.) Butters (*L. g.* Rydb.); in Canada from w. Que to BC.
6. *L. hirsuta* Eaton, hairy honeysuckle; in Canada from Que to Sask.
7. *L. hispidula* (Lindl.) Torr. & Gray; from BC to n. Calif.
8. *L. involucrata* (Richards.) Banks, black twin-berry; in NB, Que and Ont and also in Alaska, BC and s. to Mexico.
9. *L. morowii* Gray; Japan, and escaped from cult. in the US.

Lonicera

10. *L. oblongifolia* (Goldie) Hook.; in Canada in NB and Que to Man.
11. *L. prolifera* (Kirchn.) Rehd. (*L. sullivantii* Gray), grape honeysuckle; doubtfully in Canada.
12. *L. tatarica* L., honeysuckle, chèvrefeuille; s. Russia to the Altai and Turkestan; in Canada escaped from cult. NB to Alta.
13. *L. utahensis* Wats., red twinberry; from BC south into the US.

Ascochyta sp.: leaf and twig blight, brûlure des feuilles et ramilles: on *L. sp.* NB 61:104.

Botrytis cinerea Pers.: gray mold, moisissure grise: on *L. sp.* NB 41:95, 60:68, [1138]; on 8, 12 Alaska [175].

Ceratobasidium anceps (Bres. & Syd.) Jackson: on ?2 Ont [495].

Cercospora antipus Ell. & Holw.: leaf spot, tache cercosporéenne: on 3 BC, 6 Ont 45:116; on 5a, 11 Man [93, p. 114].

Ceriospora manitobiensis Dearn. & Bisby: on dead twigs of 2 Man [93, p. 53].

?*Diplodia* sp.: on leaves of 12 Man 43:111.

D. deflectans Karst.: on 12 Alaska [175].

Diplodina tatarica Allesch.: twig blight, brûlure des rameaux: on ?12 Alta 30:88.

Godronia lonicerae Seav.: on 2 Ont [977, p. 343; 979]; probably indistinguishable from *Pyrenopeziza lonicerae* Nannf. [Groves in litt.].

Herpobasidium deformans Gould (stat. conid. *Glomerularia lonicerae* (Pk.) Dearn. & House): leaf blight, brûlure des feuilles: on *L. spp.* with perfect state present Ont 34:85; imperfect state on *L. spp.*, including 1 and 1 var. *candida*, the host on which Gould, 53:107, collected the type; on *L. spp.*, 12 Que 35:68; on *L. sp.* Sask 54:123; on 2 Ont 46:86; on 2, 12 NS 53:107; on 2 NS, 12 PEI [1138]; on 12 Ont 31:94; on ?12 NB 36:77; a common disease causing noticeable injury in some years.

Kabatia lonicerae (Harkn.) Höhn. var. *americana* (Ell. & Ev.) Conners (*Leptothyrium periclymeni* (Desm.) Sacc. var. *americanum* Ell. & Ev.): leaf spot, tache ponctuée: on 2 Ont Que NS [201, p. 424], NS [1138].

K. lonicerae var. *involucratae* Conners: on 8 BC [201, p. 425]; BC, as *Leptothyrium periclymeni* [535].

K. mirabilis Bubák var. *oblongifoliae* Conners: on 10 Ont [201, p. 427]; closely resembles the imperfect state of *Gnomonia himalayensis* Müller on *L. quinquelocularis* Hardw. [202].

Leptosphaeria dumentorum Niessl: on 8 BC [50].

Leptothyrium periclymeni (Desm.) Sacc. var. *periclymeni* [*Colletotrichella p.* (Desm.) Höhn.]: leaf spot, tache leptothyrienne: on 13 BC [201, 535].

Microsphaera penicillata (Wallr. ex Fr.) Lév. var. *lonicerae* (Fr.) W.B.Cke. (*M. alni* (Wallr.) Salm. or *M. a.* var. *lonicerae* (Schlecht.) Salm.): powdery mildew, blanc: on *L. spp.* Man Ont Que NB 24:55, PEI 25:71, NS [1138]; on 5a, 12, Sask Man, 11 Man [93, p. 44]; on 7 BC [1199]; on 8 BC [535]; on 9 Man 41:95; on 12 Alta 57:118; common and occasionally unsightly.

Mycosphaerella minor (Karst.) Johans.: on 2 Que [53].

Ophiobolus minor Bubák: on dead twigs of 8 BC [50].

Phomopsis cryptica (Sacc.) Höhn.: on *L. sp.* NS [1138].

Phyllosticta caprifolii (Opiz) Sacc.: on *L. sp.* Que 33:115.

Poria ferrea (Pers.) Bourd. & Galz.: on 3 BC [1203].

Puccinia festucae Plowr.: 0 I on 4 NB [15, p. 155; 1138].

Septoria xylostei Sacc. & Wint.: on ?5a Man [93, p. 140].

Sphaeropsis zonata Pers.: on twigs of 12 Man [93, p. 140].

Verticillium dahliae Kleb.: canker, chancre verticillien: on 9 Ont 53:107.

Lotus L.

LEGUMINOSAE

Herbs of w. N. America and about the Mediterranean.

1. *L. corniculatus* L., bird's-foot trefoil, patte d'oiseau; native to Europe and Asia and adventive in N. America; cult. for ornament.
2. *L. denticulatus* (Drew) Greene (*Hosackia denticulata* Drew), BC to Calif.
3. *L. tenerum* (L. ?*tenuis* Waldst. & Kit, a synonym of 1).

Erysiphe polygoni DC. ex Mérat: on 2 BC 31:121, [50].

Fusarium solani (Mart.) App. & Wr.: from diseased basal parts of 1 Ont [335].

Low-temperature basidiomycete, basidiomycète frigophile: winter crown rot, pourridié hivernal: 1 proved very susceptible to the organism [217].

Phoma sp.: associated with a leaf and stem spot of 1 BC [535].

Sclerotinia trifoliorum Erikss.: wilt, flétrissure sclérotique: on 1, ?3 BC 50:32, [535]; on 1 Ont 53:30.

Septoria sp.: on 1 cult. Man 44:112.

Witches'-broom virus, virose-balai de sorcière: on 4 BC 49:24.

Lunaria L.

CRUCIFERAE

Annual or biennial herbs of Europe and Asia; a few grown for ornament.

1. *L. annua* L., honesty, monnaie du Pape; native to Europe; temporarily escapes from cult.

Botrytis cinerea Pers.: on *L. [Lunularia]* sp. Alaska [175].

Helminthosporium lunariae Poll.: leaf spot, tache des feuilles: on 1 BC [535].

Lupinus L.

LEGUMINOSAE

Annual or perennial herbs, particularly of w. N. America, but also in Europe and Africa; several grown for ornament and a few long used for soil renovation, for fodder and food.

1. *L. albus* L., white lupine, lupin blanc; native to the Levant.
2. *L. angustifolius* L.; native to Europe.

3. *L. arcticus* Wats.; from Alaska and Yukon to Wash.
4. *L. hirsutus* L., blue lupine, grand lupin bleu; native to s. Europe.
5. *L. latifolius* Agardh; Calif to Wash and BC.
6. *L. lyallii* Gray; Calif to Wash and BC.
7. *L. nootkatensis* Donn, including 7a, *L. n.* var. *kjellmanii* Ostenf.; Alaska to BC and naturalized in Nfld.
8. *L. perennis* L., wild lupine, lupin; e. US and s. Ont; cult. for ornament.
9. *L. polyphyllus* Lindl.; BC to Calif. and naturalized in NS and PEI.
10. *L. regalis* Bergermans (*L. hybridus* Hort.); a name applied to a group of perennial hybrids, including the Russell lupines.
11. *L. rivularis* Dougl.; BC to Wash and Oregon.

Ascochyta sp.: leaf spot, tache des feuilles: on *L. spp.* BC 42:102, [535].

A. pisi Lib. var. *lupini* Sacc.: leaf spot, tache ascochy-tique: on 10 Que 47:112; ? on *L. sp.* Man 44:112.

Botrytis cinerea Pers.: gray mold, moisissure grise: on ?4 NS 43:111, [1138].

Cylindroporium lupini Ell. & Ev.: on 7 Alaska [1038].

Dasyscyphus leucophaeus (Pers. ex Weinm.) Masee: on 7 Alaska [175].

Dendrophoma lupini-arctici Dearn.: on 3 Mack [250, p. 19C].

Epicoccum nigrum Lk. (*E. purpurascens* Ehrenb.): on *L. sp.* cult. Alaska [175]; on 7 Alaska [1038].

Erysiphe polygoni DC. ex Méral: powdery mildew, blanc: on *L. spp.* BC 31:97, [50, 535], Alta 43:20; on 7 Alaska [175], BC [1199]; on 8 BC 33:115.

Fusarium spp.: wilt and root rot, flétrissure et pourridié fusarien: on *L. spp.* Sask 36:78; Man, *F. avenaceum* (Fr.) Sacc. associated, 37:79; and PEI, attributed to *F. oxysporum* Schlecht., 45:69, [1138]. Gordon [335] reported from the basal parts or roots of 4: *F. acuminatum* Ell. & Ev., *F. oxysporum*, *F. o.* var. *redolens* (Wr.) Gordon, *F. solani* (Mart.) App. & Wr., Man; *F. equiseti* (Cda.) Sacc., *F. oxysporum*, NS. From diseased cotyledons of 9: *F. acuminatum*, *F. equiseti*, *F. oxysporum*, *F. solani*, Man.

Leptosphaeria agnita (Desm.) Ces. & de Not.: on 5 BC [50].

L. foeniculacea Fabre ssp. *lupina* Sacc. & Scalia: on *L. sp.* Alaska [175].

Mycosphaerella tassiana (de Not.) Johans.: on *L. spp.* BC [50].

Nectria ?pedicularis (Tracy & Earle) Petr. (*Nectriella p.* (Tracy & Earle) Seaver): on 5 BC [50].

Ovularia lupinicola Pollack: leaf spot or eye spot, tache ocellée: on *L. spp.* cult., 3 BC 46:86, [535]; on 10 BC 50:128.

Peronospora trifoliorum de Bary: downy mildew, mildiou: on 8 Ont 56:86; on 9 BC 46:86, [535].

Phoma herbarum West.: on 7a Yukon [600].

Phyllosticta sp.: on 7 Alaska [983].

Pleospora herbarum (Fr.) Rabh.: on *L. sp.* BC [50]; on 7a Yukon [600].

P. rainierensis Wehm. (*P. asymmetrica* Wehm.): on 5 BC [50].

P. tragacanthae Rabh.: on 6 BC [50].

Puccinia andropogonis Schw.: rust, rouille: 0 I on 8 NS [15, p. 122; 1138].

Pythium sp.: root rot, pourriture des racines: on 2 Alta 40:22.

Ramularia lupini Davis: on *L. sp.* Alaska [175].

Sclerotinia sclerotiorum (Lib.) de Bary: associated with a foot rot of 10 NS 58:110.

Septogloeum lupini Ell. & Ev.: on *L. sp.* cult. Alaska [175].

Septoria lupinicola Dearn.: on 7 Alaska [175]; on 8 cult. Ont 40:95.

Stictochorella lupini (Ell. & Ev.) Syd. apud Syd. & Petr.: on *L. sp.* Alaska [175].

Synchytrium sp.: on 11 BC [541].

Thielaviopsis basicola (Berk. & Br.) Ferr.: on 1, 2 NS [1138].

Trichopeziza earoleuca (Berk. & Br.) Sacc.: on *L. sp.* Alaska [175].

Uromyces lupini Berk. & Curt.: rust, rouille: 0 I II III on *L. spp.* cult. and wild BC 31:97, [535]; on 11 BC [1198].

Aster yellows virus (callistephus virus 1): aster yellows, jaunisse de l'aster: on 10 Que 47:112; ? on *L. sp.* Man 44:112.

Pea mosaic virus (pisum virus 2): caused streak symptoms on 1 NB 42:102; transmitted to 1, 2 NB 44:112.

Luzula DC.

JUNCACEAE

Rushes of the cold and temperate regions.

1. *L. acuminata* Raf. (*L. saltuensis* Fern.); in Canada from Nfld and NS to Sask. 1a, *L. a.* var. *carolinae* (Wats.) Fern. (*L. c.* Wats.); in Canada in ?Ont.
2. *L. arcuata* (Wahl.) Wahl.; in Alaska and also the Eurasian arctic.
3. *L. campestris* (L.) DC., black caps; in Nfld and Eurasia.
4. *L. confusa* Lindeb. (*L. arcuata* f. or var. *confusa*); in Alaska, arctic Canada and Greenl.
5. *L. multiflora* (Retz.) Lejeune (*L. campestris* var. *m.* (Retz.) Celak, *L. intermedia* (Thuill.) Nels.); in Canada from Nfld, NS and Que to BC.
6. *L. nivalis* (Laest.) Beurl. (*L. arctica* Blytt); Alaska, arctic Canada, Greenl and Labr.
7. *L. parviflora* (Ehrh.) Desv.; in Canada in Nfld, Que and BC.
8. *L. spicata* (L.) DC.; in the arctic and s. to Nfld and Que.
9. *L. sudetica* (Willd.) DC. var. *frigida* (Buchenau) Fern.; Greenl to Alaska and s. to Nfld.
10. *L. wahlenbergii* Rupr.; Alaska, across Canada to Greenl.

Luzula

- Botrytis cinerea* Pers.: on 4 Frank [971].
- Cintractia luzulae* (Sacc.) G.P.Clint.: on 4 Baffin I, Frank, 9 Nome, Alaska [957]; on 4 Frank [605].
- Clathrospora elynae* Rabh. (*Pleospora e.* (Rabh.) Ces. & de Not.): on 4 Greenl [600, 602, 603]; on 4, 6 Greenl [899]; on 8 BC [50].
- Diplodia simmonsii* Rostr.: on 2 Frank [903, p. 8]; on 4 Greenl [601].
- Hendersonia arundinacea* (Desm.) Sacc.: on 4, 6 Greenl [603]; on 6 Greenl [602].
- H. crastophila* Sacc.: on 6 Greenl [603].
- H. luzulae* West.: on 2, 5 Greenl [899]; on 4 Greenl [601].
- Hysteropezizella pusilla* (Lib.) Nannf. (*Mollisia p.* (Lib.) Rehm, *Naevia p.* (Lib.) Rehm, *Trochila juncicola* Rostr.): on 2, 4, 5, 6, 8 Greenl [899]; on 4 Greenl [601, 603]; on 4, 6 Greenl [604]; on 6 Frank [600, 903].
- Leptosphaeria carcinella* Karst.: on 4 Frank [604].
- L. culmorum* Auersw.: on 2, 5, 8 Greenl [899].
- Mollisia luzulina* Karst.: on 4 Greenl [899].
- Mycosphaerella perexigua* (Karst.) Johans.: on 4 Alaska Frank [604], Greenl [603].
- M. tassiana* (de Not.) Johans. (*Sphaerella t.* de Not.): on *L. spp.* BC [50]; on 4, 5, 6 Greenl [899]; on 4, 6 Greenl [602, 603]; on 6 Frank [604], Greenl [601].
- M. tassiana* var. *arthopyrenioides* (Auersw.) Barrs: on 6 Frank [52].
- M. tassiana* var. *tassiana*: on 4, 6 Frank [52].
- M. wichuriana* (Schroet.) Johans.: on 10 BC [50].
- Pellicularia filamentosa* (Pat.) Rogers [*Thanatephorus cumumeris* (Frank) Donk]: on 6 Frank [971].
- Phoma luzulae* Rostr.: on 8 Greenl [899, p. 569].
- Platyspora pentamera* (Karst.) Wehm. (*Clathrospora p.* (Karst.) Berl., *Pleospora p.* Karst.): on 2, 4 Frank [903]; on 4, 6 Greenl [603]; on 5 Greenl [902]; on 6 Frank [52, 604].
- Pleospora ambigua* (Berl. & Bres.) Wehm.: on 6 Frank [52].
- P. comata* Auersw. & Niessl (*Pyrenophora c.* (Niessl) Sacc.): on 8 Greenl [899].
- P. heleocharidis* Karst. and *P. heleocharidis* var. *arctica* (Karst.) Wehm. (*P. a.* Karst.): on 6 Frank [52].
- P. herbarum* (Fr.) Rabh. var. *h.* (*P. discors* (Mont.) Ces. & de Not.): on 6 Frank [604]; reported on 3 BC [50], but host is probably 5.
- P. phaeocomoides* (Berk. & Br.) Wint. var. *infectoria* (Fckl.) Wehm. (*P. i.* Fckl.): on 6 Greenl [602].
- P. togwotiensis* Wehm.: on *L. sp.* Frank [52].
- Puccinia obscura* Schroet. ex Pers.: II III on 1 or 1a Ont NS, 5 NS, 7 BC [15, p. 220]; on 1, 5 NS [1138]; on 1a Ont [828]; on 5 Alaska [175], Sask [93, p. 70]; on 7 BC [1203].
- Selenophoma drabae* (Fckl.) Petr. (*Rhabdospora d.* (Fckl.) Berl. & Vogl.): on 4 Greenl [603].
- Septoria minuta* Karst.: on 2 Frank [903]; on 3 Alaska [1038].
- S. punctoidea* Karst.: on 4 Greenl [603].
- Sphaerella luzulae* Cke.: on 2 Frank [903]; on 4 Greenl [899].
- Stagonospora aquatica* Sacc. var. *luzulicola* Sacc. & Scalia: on 2 Alaska [175].
- Trochila diminuens* Karst. (*Naevia d.* (Karst.) Rehm, [*Hysteropezizella d.* (Karst.) Nannf.]): on 4 Greenl [602].
- Wettsteinina niesslii* Müll. (*Leptosphaeria gigaspora* Niessl): on 6 Greenl [602].

Lychnis L.

CARYOPHYLLACEAE

Annual or perennial herbs of north temperate and arctic regions.

1. *L. alba* Mill., white cockle passe-jacée; naturalized from Eurasia; a weed in all provinces in Canada.
2. *L. affinis* J. Vahl ex Fries (*Melandrium affine* (Fr.) Hult., *M. involucratum* auct. non (Cham. & Schlecht.) Lange, *M. pauciflorum* (Ledeb.) Ostf.).
3. *L. alpina* L. (*Viscaria a.* (L.) G. Don) sweet william; arctic and alpine regions of N. America and Eurasia.
4. *L. apetala* L. (*Melandrium apetalum* (L.) Fenzl). 4a, *L. a.* var. *arctica* (Fries) Cody (*M. apetalum* ssp. *arcticum* (Fries) Hult., ?*Viscaria arctica*).
5. × *L. arkwrightii* Hort. (*L. haageana* × *L. chalconica*), a cultivar.
6. *L. chalconica* L., scarlet lychnis or Maltese cross, croix de Jérusalem; native to Asia; escaped from cult. in Canada in PEI.
7. *L. coronaria* (L.) Desr., rose campion or dusty miller, coquelourde; native to Europe; escaped in Canada in s. Ont.
8. × *L. haageana* Lam., a cultivar.
9. *L. triflora* R.Br. (*L. sorensensis* Boivin, *Melandrium triflorum* (R.Br.) J. Vahl).

Alternaria ?dianthi Stev. & Hall.: on 6 Alaska [175].

Botrytis cinerea Pers.: on *L. sp.* Alaska [175].

Cladosporium herbarum Lk.: on 2 Greenl [901]; on 2, 9 Greenl [899]; on 9 Greenl [602].

Dendryphon nanum (Nees) Hughes (*Helminthosporium n.* Nees): on 3 Greenl [899].

Helotium herbarum (Pers.) Fr.: on 9 Greenl [603].

Heteropatella umbilicata (Pers. ex Fr.) Jaap (*Septoria cercosperma* Rostr.): on 3, 7a Greenl [899].

Leptosphaeria vahlii Rostr.: on 9 Greenl [899, p. 557; cf. 52].

Mycosphaerella cruciferarum (Fr.) Lindau (*Sphaerella c.* Fr.): on 7a Greenl [899].

M. densa (Rostr.) Lind.: on 4a Frank [971].

M. minor (Karst.) Johans.: on 3 Labr [52].

M. tassiana (de Not.) Johans. (*M. pachyasca* (Rostr.) Vesterg., *Sphaerella sibirica* auct. non Thüm.): on 2 Yukon [600], Greenl [901]; on 2, 4 Frank [604]; on 2, 4, 9 Greenl [603, 899]; on 3 Greenl [899]; on 4, 9 Greenl [602]; on 7 BC [50].

M. tassiana var. *arctica* (Rostr.) Barr: on 2 Frank Que [52].

M. tassiana var. *arthopyrenioides* (Auersw.) Barr: on 4a Que [52].

Niptera lychnidis (Fckl.) Lind.: on 4a Frank [600].

Phoma complanata (Tode ex Fr.) Desm.: on 9 Greenl [603].

P. punctiformis Desm.: on 3 Greenl [899].

Phyllosticta dianthi West.: on 6 cult. Sask Man [93, p. 135]; but see *P. lychnidis*.

P. lychnidis A. Bondarzew: leaf spot, tache des feuilles: on 1, 6 BC [535]; on 6 Sask Que 35:70, Man Ont 45:116, Ont 43:111, Que 34:87; ? on *L. sp.* Sask [93, p. 135]. It appears that *P. lychnidis* and *Septoria lychnidis* (q.v.) are states of a single organism, the host influencing the state that develops, 45:116.

Platyspora pentamera (Karst.) Wehm. (*Clathrospora p.* (Karst.) Berl., *Pleospora platyspora* sensu Rostr.): on 4 Frank [604], Greenl [602]; 9 Greenl [603]; on 74a Greenl [899].

Pleospora ambigua (Berl. & Bres.) Wehm.: on 4a Frank [52].

P. androsaces Fckl. (*Pyrenophora a.* (Fckl.) Sacc.): on 2 Mack [604]; on 9 Greenl [602].

P. cerastii Oud. (*Pyrenophora c.* (Oud.) Lind): on 4 Alaska [175], Greenl [602]; on 9 Greenl [603].

P. comata Auersw. & Niessl (*Pyrenophora c.* (Niessl) Sacc.): on 2 Greenl [901]; on 2, 3, 9 Greenl [899]; on 3 Labr [52].

P. dianthi de Not. (*Pyrenophora d.* (de Not.) Berl.): on 2, 4 Greenl [603]; possibly the same as *P. androsaces*, (q.v.).

P. helvetica Niessl: on 2, 4a Frank, 4 Que [52].

P. herbarum (Fr.) Rabh. (*P. armeriae* (Cda.) Ces. & de Not.): on 2 Frank [900]; on 2, 3, 9 Greenl [899]; on 7 BC [50, 1140].

P. penicillus (Schm.) Fckl. var. *p.* (*P. chrysospora* Niessl, *Pyrenophora c.* (Niessl) Sacc.): on 2 Greenl [901]; on 4a Frank [600]; on 9 Greenl [603].

P. phaeocomoides (Berk. & Br.) Wint. (*P. vulgaris* Niessl): on 4 Alaska [175, 250].

P. phaeocomoides var. *infectoria* (Fckl.) Wehm. (*P. i.* Fckl.): on 2, 4 Greenl [603]; on 4 Greenl [602].

P. pyrenaica Niessl: on 9 Greenl [604].

Sclerotium rufum Rostr.: on 3 Greenl [901].

Septoria lychnidis Desm.: leaf spot, tache des feuilles: on 5 Man, 8 Ont 43:111; on 6 as *S. noctiflorae* Ell. & Kell., Man 35:70; on 6, 8 cult. Man [93, p. 138]; on 7 NB 60:69.

S. viscaria Rostr.: on 3 Greenl [899, p. 573].

Uromyces verruculosus Schroet.: only II present on 1 NS [1138; cf. 15, p. 285].

Ustilago violacea (Pers.) Roussel: on 4 Keew Frank Greenl, 4a, 9 Frank [959]; on 4, teste Liro, 9 Frank [957]; on 4a Frank [600, 962].

U. violacea var. *violacea*: on 4a, 9 Frank [971].

Volutella sp.: associated with a leaf blight of 6 Que 56:129.

Lycium L.

SOLANACEAE

Shrubby, often spiny plants of temperate and tropical regions.

1. *L. chinense* Mill., Chinese matrimony vine; introduced from Asia; escaped from cult. in the US.
2. *L. halimifolium* Mill., common matrimony vine, lyciet; introduced from Europe; escaped from cult. in the US and locally n. into Canada.

Puccinia tumidipes Pk.: an 0 II III rust, but only II² and III known on 2 in Ont [828].

?*Sphaerotheca pannosa* (Wallr. ex Fr.) Lév.: powdery mildew, blanc: on *L. sp.* BC 40:95; on 1 BC 34:87.

Potato leaf-roll virus (solanum virus 14): recorded on 2 NB 43:111.

Lycopersicum Mill.

SOLANACEAE

Perennial or perhaps annual herbs of S. America; two grown for their edible fruit.

1. *L. esculentum* Mill., tomato, tomate; native to w. S. America. 1a, *L. e.* var. *cerasiforme* (Dunal) Alef. (*L. c.* Dunal), cherry tomato, tomate à confitures. 1b, *L. e.* var. *commune* Bailey, common tomato, tomate, a cultigen.
2. *L. hirsutum* Humb. & Bonpl. 2a, *L. h.* var. *glabratum* Muller.
3. *L. pimpinellifolium* (Jusl.) Mill., currant tomato; native to Peru.

Alternaria solani (Ell. & Martin) Jones & Grout: early blight, brûlure alternarienne: on 1b across Canada, 24:45, 25:58, 31:55, 41:57, 44:76, 50:87; including Que 33:115, [cf. 93, p. 112; 1138]. Often reported in BC and from Ont eastward and loss of fruit not uncommon BC 32:56, Ont 39:65, 56:87, NS 57:84. In canning areas the losses from early and late blight appeared to warrant protective measures despite their cost Ont 51:78, NS 58:81.

A. tenuis auct. sensu Wiltshire: on fruit of 1b NS 43:74, [1138]; and probably widespread.

A. tomato (Cke.) Brinkman (*Macrosporium t.* Cke.): nailhead spot, tête de clou: on 1b BC 55:91, Alta 46:60, Man 56:92, Ont 37:48, 40:58; on fruit imported from Mexico, 54:98, 59:65. Probably more widely present than the records suggest, but not well distinguished from *A. solani* and *A. tenuis*.

Botrytis cinerea Pers.: gray mold, moisissure grise: on 1a, 1b Ont [491]; on 1b BC 34:51, Alta 47:77, Ont 38:67, Que 54:98, ?NB 55:91, NS 49:72, PEI 56:92, Nfld 52:75. As a cause of a fruit rot the fungus is common, and losses may be heavy in transit BC 39:65; in stem rot or girdle in the greenhouse BC 33:40, Ont 43:74, 44:76, NS 51:78; in a ring spot Ont 40:56, 56:92; and in ghost spot Ont Nfld 53:83. The disease has become a serious problem in growing tomatoes commercially in NS 56:92. Because maneb and zineb were effective against late blight but not against gray mold and the converse was true for thiram, current recommendations are to apply 2 lb each of maneb and thiram in 100 gal of water four to five times a season [420].

Cladosporium fulvum Cke.: leaf mold, moisissure olive: a common disease of 1b in greenhouses, particularly of the fall crop, BC Alta Man-Que NS-Nfld 24:58, 30:53, 33:39, 35:42, 52:75, [93, p. 116; 1138], less often in field Ont 37:46, 39:64, 53:83, Que 45:81, NB 33:39, NS 61:83, loss of crop was often heavy BC 25:58, Ont 30:53, NS 36:44, PEI 37:46.

By 1950, seven races of *C. fulvum* had been identified by their reaction on cultivars of 1b, 2, 2a and 3; five were considered new races that arose from mutation as only two were detected when the study began [41]. Resistance to forms 1 and 3 is conferred by dominant genes that were located on chromosome maps of the tomato. The reaction of the host to the pathogen varied greatly depending on light and humidity [583]; an autogenous necro-

Lycopersicum

sis is also described [584]. Vetomold was the first of a series of mold-resistant cultivars released from the Vineland Hort. Exp. Station, in Ont 40:57. It was resistant the year of its introduction Ont 39:64, BC 40:57, but not the next year Ont 40:57, BC 41:57. Later releases failed to remain resistant, but in 1955 because most growers in the Leamington area, Ont, now grew resistant cultivars in the fall crop, the incidence of the disease was low. Vagabond and several unnamed selections from Vineland showed resistance Ont 55:91, and Vinequeen has so far proved resistant, 58:80. Because the spring crop rarely becomes affected, susceptible cultivars are still grown but under high humidities, as in 1957, Ont 57:85, and in plastic greenhouses Ont 59:65, 61:83, leaf mold can quickly become destructive. For studies on the nature of resistance to the pathogen in the tomato, see [43].

Colletotrichum coccodes (Wallr.) Hughes (*C. atramentarium* (Berk. & Curt.) Taub., non *C. phomoides* (Sacc.) Chester): anthracnose, anthracnose: on *lb* Sask 56:92, Man 45:81, Ont 37:48, Que 40:58, NS PEI 49:72. Fruit rot evidently caused by this pathogen was unknown in Canada until 1937, Ont 37:48, but it was epidemic the next year, 38:67, and has continued to be "the most important disease of the canning crop," 57:84, especially in crops on sandy soil, 55:91. Recently the pathogen was shown to be the most common cause of anthracnose in the crop. Although infection occurs readily on all parts of the plant, including the fruit, further development is arrested until the surrounding host tissues become senescent [491]. Infections in the early stage have been entirely overlooked.

Lesions on the fruit develop rapidly after mid-September. Cultivar resistance so far found is of a low order. On sandy soils where anthracnose is very prevalent, maneb has greatly reduced its incidence, 56:89. A bimonthly application of maneb from early July until mid-September is recommended, 57:84.

The fungus has been found causing a root rot and wilt of *lb* in the greenhouse Ont 49:72, 51:79, 54:99, and field Ont 57:85.

C. dematium (Fr.) Grove: isolated once from an atypical anthracnose lesion on a fruit of *lb* Ont [491].

C. gloeosporioides Penz. (*C. phomoides* (Sacc.) Chester; stat. conid. of *Glomerella phomoides* Swank, *G. cingulata* (Stonem.) Spauld. & Schrenk.): from fruits of *lb* Ont 56:92, 57:85.

Corynebacterium michiganense (E.F.Sm.) Jensen (*Aplanobacter m.* E.F.Sm.): bacterial canker, chancre bactérien: on *lb* BC 24:45, Alta 44:76, Sask 43:75, Man [93, p. 28], Ont Que 40:58, NS 49:72. A disease of sporadic occurrence but it may be destructive in individual fields Ont 59:65, or more widespread BC 43:75.

Erwinia aroideae (Townsend) Holland and/or *E. carotovora* (L.R.Jones) Holland: soft rot, pourriture molle: on *lb* Ont 37:47, Que 40:58.

Fungi from seed: of *lb*: *Alternaria consortialis* (Thüm.) Groves & Hughes, Ont; *A. tenuis* auct. sensu Wiltshire, BC; *Aspergillus ruber* (Brem.) Thom & Raper, Ont; *A. tamari* Kita, *A. terreus* Thom, NJ; *Aureobasidium pullulans* (de Bary) Arn., *Chaetomium aureum* Chivers, *C. funicola* Cke., Ont; *C. globosum* Kze., Ont Que Mich; *C. indicum* Cda., Ont NJ; *C. murorum* Cda., Man; *C. reflexum* Skolko & Groves, NJ; *C. seminudum* Ames, Pa [374]. *Fusarium oxysporum* Schlecht., BC [374], Ont [334]. *Gelasinospora cerealis* Dowding, Que; *Melanospora zamiae* Cda., *Mucor adventitius* Oud. var. *aurantiacus* Lendner, *Oospora lactis* Fres., Ont; *Papularia arundinis* (Cda.) Fr., BC; *Perisporium funiculatum*

Preuss, Minn; *Petriella asymmetrica* Curzi, Man Ont; *Rosellinia limoniiformis* Ell. & Ev., BC Man; *Sordaria dakotensis* Griff., Minn; *Sporormia leporina* Niessl, Mich; *Trichoderma viride* Pers., BC [374]. *Tripterospora brevicaudata* Cain Ont [217], NJ [374].

Fusarium oxysporum Schlecht. f. *lycopersici* (Sacc.) Snyd. & Hansen: wilt, flétrissure fusarienne: recorded on *lb* in greenhouse BC 30:54, Sask 43:75, Ont Que 35:50, Ont 44:76, Que 39:65, NS 61:84, PEI 42:57; and in field Alta 50:89, Man 38:66, Ont Que 34:50. *F. o. f. lycopersici* isolated in Man [335], and *F. sp.* in Ont 37:47, PEI 42:69; more prevalent in Ont in two successive dry summers, 52:75, 53:84. Pectic enzyme production of the fungus appears to be causally related to the virulence of a given strain [855].

Fusarium spp.: fruit rot, pourriture fusarienne: Que 40:58; isolated from decayed areas of the fruit were: *F. acuminatum* Ell. & Ev., *F. equiseti* (Cda.) Sacc., *F. solani* (Mart.) App. & Wr. in Man [335].

Meloidogyne sp. (*Heterodera marioni* (Cornu) Goodey, *H. radiculicola* (Greef), Müll., *Caconema r.* (Greef) Cobb): root-knot nematode, nodosité des racines: reported on *lb* in greenhouses BC 30:54, 32:110, Alta 43:75, Ont 25:59, Que 39:66, NB 52:75; loss in individual greenhouses may be severe BC 35:43, 55:92.

M. arenaria (Neal) Chitwood var. *arenaria*: on *lb* in greenhouse Ont 61:357.

M. incognita (Kofoid & White) Chitwood: on *lb* in greenhouse BC 59:65.

Mycosphaerella tassiana (de Not.) Johans.: on *lb* BC [50].

Nigrospora sphaerica (Sacc.) Mason: on insect-injured leaves of *lb* Man [93, p. 122].

Oospora lactis Fres.: on ripe fruit of *lb* Man 37:48; on fruit held in storage Que 40:58.

Pellicularia filamentosa (Pat.) Rogers (*Corticium solani* (Prill. & Delacr.) Bourd. & Galz.): on stems of *lb* Winnipeg, Man [93, p. 76].

Phoma destructiva Plowr.: fruit rot, pourriture phoméenne: on *lb* BC Que 41:57, Alta 46:80, Man [93, p. 134], Ont 39:66, NS 51:79; occasionally severe in the field Ont 39:66, and in storage NS 53:84; once also on leaves BC 50:89, and in damping-off BC [535]; on imported fruits, 34:51. A survey of storage rots in NS revealed that *P. destructiva* was the most prevalent, followed by *Alternaria tenuis* and *Botrytis cinerea*, 59:67.

Phomopsis vexans (Sacc. & Syd.) Harter: cause of a soft rot that severely damaged imported fruits of *lb* Que 34:50.

Phytophthora cactorum (Leb. & Cohn) Schroet.: fruit rot, mildiou polyphage des fruits: on *lb* in greenhouse Ont 39:65.

P. infestans (Mont.) de Bary: late blight, mildiou: on *lb* across Canada 24:45, 32:56, 34:50, 35:42, 40:59, 41:58, 43:75, 53:84, [1138].

According to Prof. J. E. Howitt, 1940 was the first year that *P. infestans* was observed causing a serious rot of fruit in Ont, 40:59. The pathogen was again epidemic in Ont 46:61, when an epidemic occurred in the eastern half of the US from Florida northward. For the next two years late blight was fairly prevalent 47:78, 48:69. In 1951 a firm recommendation to spray or dust with a fixed copper at fortnightly intervals was made and where followed the disease was controlled 51:79. Late blight was again epidemic in 1957 not only in Ont but in e. US and only well-sprayed fields escaped substantial losses 57:87. With its increased prevalence, spread

of the disease from field to greenhouse, 49:73, and from greenhouse to field, 50:89, increased. In recent years, too, appreciable losses from late blight have occurred widely in Canada: NB NS PEI 41:58, Que 42:69, Alta and n. Ont 43:75, Man 44:77.

Undoubtedly a highly pathogenic strain must have been introduced into Ont before 1940 to account for the sudden appearance of late blight in such a virulent form. Mills [733] observed that as late as 1938 the more or less regular appearance of tomato blight in the e. US was confined to W Va and Va. He accounted for its rare occurrence in NY to the belief that the tomato strain must be built up anew "for practically every epiphytotic of tomato blight in this region." He showed that the local "potato strain" of *P. infestans* must undergo several passages through tomato foliage before it became fully virulent on tomato. On the other hand, potato foliage and tubers were fully susceptible to the "tomato strain." While an important source of inoculum may now be the fungus overwintering in the potato tuber, 48:69, the initial introduction of a more virulent strain may well have been through infected southern-grown transplants 46:61, 57:87. The practice of growing transplants in the field in one region and planting them out in another certainly hastens the spread of potent pathogens.

It is possible that the cultivars now commonly grown are susceptible to more races of the pathogen than those formerly cult. As Graham [343] points out, the mycelium of *P. infestans* appears to be heterokaryotic and pure lines can be obtained only by isolating single zoospores. He found that Stokesdale, a widely grown variety, was susceptible to all eight races found in the 70 isolates studied, whereas Geneva T-5 was susceptible to only two races (three isolates). These two races were also isolated from Rutgers.

Septoria lycopersici, *Alternaria solani* and *P. infestans* were controlled at Ottawa by six applications of a fixed copper (COCS 55) or maneb (Manzate) [345].

Phytophthora parasitica Dast. (*P. terrestris* Sherb.): buck-eye rot and stem rot, mildiou zoné: on fruits of *lb* BC 24:45, 50:90, Ont 52:76, Que 40:59; on stems in greenhouse Ont 37:49, 42:69; in damping-off Alta 48:68, Ont 42:69, 46:61. Plants under glass are affected at all stages of development [880].

Pratylenchus penetrans (Cobb) Filipjev & Stekh.: root-lesion nematode, nématose des racines: heavy infestations noted on *lb* Ont 61:84, 376.

Pseudomonas solanacearum E.F.Sm.: southern bacterial wilt, flétrissure bactérienne: on *lb* Ont 49:73.

P. tomato (Okabe) Altstatt (*P. punctulans* Bryan): bacterial speck, moucheture bactérienne: on *lb* Alta 51:80, Man 40:58, Ont 46:61, 47:78, Que 57:87; very occasionally severe Man 41:57.

Pyrenochaeta terrestris (Hansen) Gorenz, Walker & Larson: on roots of *lb* BC 62:69.

Pythium spp., including *P. debaryanum* Hesse: damping-off, fonte des semis: on *lb* Ont 25:59, 37:47, NB 36:45, 56:93, PEI 49:73; as a stem rot Ont 33:40, NB 36:45; undoubtedly occurs more widely than these records indicate.

Rhizoctonia solani Kühn: damping-off and root rot, fonte des semis et rhizoctone commun: on *lb* BC 31:57, Man Ont 25:58, Ont 38:66, Que 40:59, NS 58:82, PEI 43:76, [cf. 93, p. 125]; cultivar differences observed, 57:84.

Rhizopus sp.: fruit rot, pourriture des fruits: on *lb* Que 40:59, 57:88.

Sclerotinia sclerotiorum (Lib.) de Bary: stem rot, pourriture sclérotique: on *lb* BC 33:40, Alta 36:45, Ont

Que 25:58, Ont 47:78, 58:78, NB 24:45, NS 32:58, PEI 61:84; only rarely destructive NS 58:82.

Septoria lycopersici Speg.: leaf spot, tache septorienne: on *lb* Man-Nfld 24:45, 34:50, 50:90; Ont 33:115, recorded once from Alta 40:59, in greenhouses BC 25:58, 55:93, [cf. 93, p. 138; 1138]. Losses from defoliation may be heavy in Ont 24:45, 37:47, 38:66, and sometimes in Que 44:77, and NS 42:69. Regular spraying has reduced its incidence in recent years Ont 61:85; new cultivars, such as Bounty, 43:76, and Ferguson, 56:94, are extremely susceptible. Two physiologic forms were observed; influence of temperature, humidity and nutrition of the host on the parasitic relationship is described [662].

Spongospora subterranea (Wallr.) Lagerh.: young plants of *lb* experimentally infected [593]; see *Solanum*.

Stemphylium solani Weber: gray leaf spot, tache grise: on *lb* Ont 55:93, 62:76, probably a newcomer of some importance.

Trichothecium roseum Pers.: cause of a fruit rot of *lb* Ont 58:79.

Verticillium spp.: wilt, flétrissure verticillienne: on *lb* BC 34:50, Alta 55:93, Ont 29:40, Que 50:90, NS 35:43, PEI 43:76, [cf. 1138]; usually first noticed in the greenhouse and later in the field. A severe epidemic caused by *V. albo-atrum* Reinke & Berth. occurred in the Niagara Peninsula, Ont, in 1940 [690]. In the BC interior wilt caused by *V. dahliae* Kleb. is widespread and destructive, 49:74 et seq., and in 1952 the loss was estimated at 6.6 percent of the crop, or 2,725 tons of fruit, 53:77. Fortunately a source of resistance was found and the development of the resistant commercial cultivar Summerdawn suitable to the area has been realized [256]. Wilt is also present every year in s.w. Ont and the fungus, now recognized to be *V. dahliae*, is considered the most destructive of the soil pathogens in the area, 59:66, 61:85. *V. albo-atrum* isolated from *lb* n. Ont [77]. *V. ovatum* Berk. & Jackson [76, p. 268] (near *V. dahliae*) was recorded on *lb* Ont 30:54.

Xanthomonas vesicatoria (Doidge) Dowson: bacterial spot, tache bactérienne: on *lb* Alta 40:58, Man NS 41:58, Ont 32:56, Que 38:67, PEI 47:79, [cf. 1138]; first observed in Canada in 1918, fide Gardner and Kendrick, 42:70. Serious outbreaks have occurred in a few fields. Untreated, contaminated seed is the source of infection NS 41:58, Ont 59:66.

Aster yellows virus, sensu lat.: purple top, pourpre: on *lb* Sask Man Ont 57:89, NB PEI 42:71, NB 47:79, 55:93, NS 60:99; rarely observed on *lb* except when the virus is prevalent on other crops.

Beet curly-top virus: western yellow blight or yellows, jaunisse: on *lb* BC 24:46; recorded with some regularity in the BC interior from Summerland south and occasionally causing appreciable loss, 41:59. Diagnosis has been entirely on symptoms: The only known vector in N. America, *Circulifera tennellus* (Baker), has been collected once at Summerland, but Davis [246] reported collecting the adults of the leafhopper as far north as Cache Creek and adults and nymphs on *Salsola kali* L. var. *tenuifolia* Tausch at Chase and Merritt. The distribution of the insect parallels that of the disease.

Cucumber mosaic virus: occasionally reported from the fern-leaf symptoms: Man 43:77, Ont 46:62, Que 48:70, NB 51:81; or the shoe-string symptoms: Ont 32:55, 42:70, 49:74. In Ont [55] the virus was infrequently isolated and shoe-string symptoms may be caused by TMV (q.v.). However, severe infections may occur associated with aphid infestations Ont 55:93, and the virus has been isolated from canning crops, 58:83.

Lycopersicum

Potato virus X (solanum virus 1): may cause mosaic symptoms in *1b* NB 40:60, 42:70, 51:81; and possibly streak symptoms BC [781, 785; cf. 784]. Usually this virus is associated with TMV to produce streak [666], but single virus streak may occur Ont 54:103, 57:89.

Potato virus X and tobacco mosaic virus: streak or double virus streak, bigarrure: first observed in *1b* in greenhouses in Ont in 1915, but its virus nature was not recognized [473]. Streak occurs mostly in the greenhouse but also in the field BC 25:59, Alta Ont Que 24:46, Sask Man 35:42, NB 30:53, 41:59, NS 50:91, PEI 42:70.

According to MacNeill and Isman [666], tomato streak in Ont is of a double-virus nature resulting from the synergistic action of PVX and TMV. Expression of the disease is a function of both virus components, a variation in strain characteristics of PVX or TMV being reflected in the intensity of the reaction in the tomato. The extreme severity of streak in greenhouse and field in Ont appears to be associated with a given geographic strain of TMV. This virus, petunia local-lesion virus, PLV, induces primary lesions on petunia without subsequent systemic infection of the host. Air temperatures above 26 C mask the symptoms of both viruses. These authors confirm the findings of Vanterpool [1099] on streak or winter blight of greenhouse tomatoes in Que that for the most part streak is caused by the combined action of PVX and TMV. Berkeley [70, 73] contended that the etiological agent was tomato streak virus 1, a strain of TMV. Newton [781] and Newton and Edwards [785] offered evidence that in BC streak was caused by a strain or strains of PVX, unassociated with TMV. MacNeill and Isman [666] do not rule out the view that streak may be caused by a single virus, but they contend that double-virus streak is the prevalent disease.

Potato virus Y: isolated from canning crops of *1b* Ont 56:95, 58:63.

Tobacco-etch virus (nicotiana virus 7): on *1b* Ont 53:85; isolated from canning crops in Essex Co., 55:93, 58:83; apparently confined to s.w. Ont [47].

Tobacco mosaic virus (nicotiana virus 1): in Ont, as a survey in 1957-58 showed, this virus is very common in seedlings of *1b* and in transplants in the field, causing a mild mottle, 54:103, [664]. Already common in Ont in 1920, 20:54, it has since been reported from every province and in the Yukon 54:102; common wherever tomatoes are grown commercially. The virus was identified from specimens from the Yukon 54:102, Man 48:70, Que [1099], 53:85, NB 41:58, 42:70, 51:81, Nfld 54:102.

Internal browning and gray or brown wall in fruit in greenhouse and field has been found to be usually associated with TMV infection 53:85, 54:102, 58:83. Spraying with a dilute milk-water solution held mosaic in check in greenhouses NS 54:102, 55:93. In field experiments the early yield was significantly reduced (34%) by TMV. Spraying the transplants with reconstituted powdered skim milk and allowing them to dry off before pulling was an effective, economical and convenient means of reducing the spread of TMV in BC [255].

Tobacco mosaic virus, strain (tomato streak virus, *lycopersicum* virus 1): this single virus induces streak, but it is not common in Ont [664], NB 47:80.

Tomato bunchy-top virus: on *1b* NB 47:79; only report.

Tomato spotted-wilt virus (*lycopersicum* virus 3): spotted wilt, tache de bronze: in *1b* Alta 37:49, 44:78, Sask 32:57, Ont 34:49, 40:60, NS 62:70. An uncommon disease but the virus has been demonstrated experimentally [71, 664].

Blossom-end rot, pourriture apicale: physiological, physiologique: on *1b* BC to Nfld 24:46, 27:84, 30:53, 31:54, 50:91; common and serious in hot dry seasons under fluctuating moisture conditions, especially in soils of low water-holding capacity, low organic matter, 55:94, or low in calcium, 58:84; the disorder also affects the occasional greenhouse crop.

Blotchy ripening, maturation en taches: physiological, physiologique: on fruits of *1b* BC Ont 38:68, NB 51:82, NS 55:94, PEI 41:59; the most severe outbreaks appeared to occur on plants affected by virus, Ont 58:63, NS 57:88.

Cat-face, face de chat: physiological, physiologique: on *1b* Ont 55:84, Que 56:96, NB 59:66.

Chemical injury: from aldrin Ont 56:96; uneven application of boron to soil, BC 59:67, and as a spray on plants, NS 62:71; from creosote fumes, Que 39:66, 52:78; from hormones, BC 50:91, Ont 47:90, Que 47:80, NS 49:75; from fungicides, maneb to young seedlings, Ont 55:94, [703], and ?zineb (Dithane) NB 47:80; from herbicides, 2,4-D, BC NS 50:91, Alta Sask 52:78, Man 53:86, Ont NB 51:82, and 2,4,5-T, BC 49:75; from illuminating gas, Ont 36:45.

Element deficiencies, carence des éléments: of magnesium BC 46:62, Ont 58:84, PEI 44:78; of manganese Ont 42:71; of phosphorus BC 53:86, PEI 50:92; of potassium Que 38:62, NS 54:104, PEI 39:66.

Leaf roll or curl: physiological, physiologique: on *1b* Sask 31:56, [cf. 389]; common on staked tomatoes.

Oedema, œdème: physiological, physiologique: on *1b* Ont 26:60, 31:56.

Sun scald, insolation: physiological, physiologique: on *1b* Sask Que 47:80, Man 54:104, Ont 36:45, Nfld 52:78.

Walnut wilt, toxemia caused by black walnut: on *1b* Que 53:86.

Lycopodium L.

LYCOPODIACEAE

Perennial plants with evergreen leaves of almost cosmopolitan distribution.

1. *L. alpinum* L.; Arctic regions s. to BC and Que.
2. *L. annotinum* L.; Labr.; Nfld and NS to Alaska. 2a, *L. a.* var. *acrifolium* Fern.; of similar range. 2b, *L. a.* var. *pungens* (La Pylaie) Desv.; Greenl and Labr to Alaska s. to Nfld, NB, NS, PEI, Ont and Sask.
3. *L. selago* L., rat's tail, herbe aux porcs; arctic regions s. to Nfld.

Botrytis sp.: on 2 Alaska [983].

Heteropatella umbilicata (Pers. ex Fr.) Jaap (*Septoria cercosperma* Rostr.): on 2 Greenl [900].

Lamproderma cribrarioides (Fr.) R.E.Fries: on 2 Greenl [900].

Leptosphaeria crepinii (West.) de Not.: on 1, 2 Greenl [899]; on 2 Alaska [983], Greenl [900].

Lycopsis L.

BORAGINACEAE

Annual herbs native to the Old World.

1. *L. arvensis* L., bugloss, chandronnette; naturalized from Europe; in Canada from Nfld and NS to Ont.

Puccinia recondita Rob. ex Desm. (*P. rubigo-vera* Wint.): 0 I on 1 Ont [828], but in error; known, however, from Ind [15, p. 181].

Lycopus L.

LABIATAE

Perennial herbs of the northern hemisphere.

1. *L. americanus* Muhl.; in Canada from Nfld and NS to BC.
2. *L. asper* Greene (*L. lucidus* Turcz. var. *americanus* Gray); from Alaska to Calif e. to Man in Canada.
3. *L. rubellus* Moench; in e. US.
4. *L. uniflorus* Michx., bugleweed; in Canada from Nfld and NS to BC.
5. *L. virginicus* L.; probably mistaken for 4 in PEI.

Ceratobasidium anceps (Bres. & Syd.) Jackson: on 1 Ont [495].

Gibberidea abundans (Dobr.) Shear: on 1 NS [1138].

Puccinia angustata Pk. (*P. eriophori* Thüm.): 0 I on 1, 3, 5 Ont, 2 Sask, 4 NB [15, p. 194]; on 1 NS, 4 NB NS PEI, 5 PEI [1138]; on 2 Sask 24:59, [93, p. 65]; on 4 Que 32:103, PEI 34:104; on 5 PEI 31:122.

P. menthae Pers.: 0 I II III on *L. sp.* NS [15, p. 53]; an unusual record.

Lygodesmia D.Don

COMPOSITAE

Herbaceous rushlike plants of N. America.

1. *L. juncea* (Pursh) D.Don, skeletonweed; in Canada from Man to Alta.

Puccinia dioicae P.Magn. (*P. extensicola* Plowr., *P. patruelis* Arth.): 0 I on 1 Sask 29:76, [93, p. 69]; cf. 15, p. 197].

P. grindeliae Pk. (*P. lygodesmiae* Ell. & Ev.): III on 1 Sask 24:59, Man [93, p. 69].

P. stipae Arth.: 0 I on 1 Sask 33:115, [15, p. 141], Sask Man [93, p. 71], BC [1203].

Lygodium Sw.

SCHIZAEACEAE

Climbing ferns, mostly of the tropics.

1. *L. circinatum* Sw.; a native of tropical Asia.
2. *L. palmatum* (Bernh.) Sw., Hartford fern; in Ga and Tenn and locally elsewhere in the e. half of the US.

Phyllosticta pteridis Halst.: leaf spot, tache des feuilles: on 1 greenhouse Que 41:87.

Lysimachia L.

PRIMULACEAE

Perennial herbs widely distributed in the temperate and tropical regions.

1. *L. ciliata* L. (*Steironema ciliatum* (L.) Raf.); in Canada in NS and from Que to BC.
2. *L. nummularia* L., moneywort or creeping jenny, monnayère; naturalized from Europe; in Canada from Nfld and NS to Ont.
3. *L. terrestris* (L.) BSP., yellow loosestrife; in Canada from Nfld and NS to Man.
4. *L. thyrsiflora* L., tufted loosestrife, corneille en bouquet; in NS and from Que to Alaska; also in Eurasia.

Helotium dearnessii (Ell. & Ev.) White: on dead stems of 1 Ont [979]; on dead stems Ont Que [1164, p. 167].

Phyllosticta decidua Ell. & Kell.: on 1 Man [93, p. 135].

Puccinia caricina DC. var. *limosae* (Magn.) Jørstad (*P. limosae* Magn.): 0 I on 1 NS [1138]; on 4 Man [93, p. 69], Man Ont [15, p. 212].

P. dayi Clint.: III on 1 Alta Sask Ont [15, p. 169], Alta Sask [93, p. 67].

P. distichlidis Ell. & Ev.: 0 I on 1 Sask Man [93, p. 67], Man [15, p. 167].

Ramularia lysimachiae Thüm.: on 1 Man [93, p. 125].

Septoria conspicua Ell. & Martin: common on 1 Sask Man [93, p. 138].

S. lysimachiae West.: leaf spot, tache des feuilles: on 2 Ont Que 48:110.

Synchytrium aureum Schroet.: on 3 NS [1138]; probably *S. vaccinii* Thomas [cf. 542].

Uromyces acuminatus Arth.: 0 I on 1 Ont [828; cf. 15, p. 167].

Lythrum L.

LYTHRACEAE

Annual or perennial herbs widely scattered in warm and temperate regions; a few grown for ornament.

1. *L. salicaria* L., purple loosestrife, salicaire; naturalized from Europe; in Canada from Nfld and NS to Que and in Man.

Septoria lythrina Pk.: leaf spot, tache des feuilles: on *L. sp.* cult. Ont 54:134.

Madia Molina

COMPOSITAE

Herbaceous plants of w. N. and S. America.

1. *M. sativa* Molina, tarweed, madi; from s. Alaska to Calif and S. America; adventive in E. Canada in Que.

Coleosporium madae Cke.: II III on 1 BC [15, p. 46].

Mahonia Nutt.

BERBERIDACEAE

Evergreen shrubs of N. and Central America and e. and s.e. Asia, grown for their handsome foliage and yellow flowers.

1. *M. aquifolium* (Pursh) Nutt., mahonia, houx; BC to Idaho and Oregon.
2. *M. nervosa* (Pursh) Nutt., Oregon grape; BC to Calif.
3. *M. repens* (Lindl.) G. Don (?*M. diversifolia* Sweet); BC and Alta to Calif.

Coccomyces dentatus (Schm. ex Fr.) Sacc.: on 1, 2 BC [1198].

Gumminsiella mirabilissima (Pk.) Nannf. (*C. sanguinea* Arth., *Uropyxis s.* Arth.): rust, rouille: 0 I II III on 1 BC 38:105, 47:12, [1198], Ont 56:129, Que 49:107; abundant on plants imported from Europe, 50:128, and now established in Ont [828] and Que 56:129.

Gloeosporium berberidis Cke.: leaf spot, anthracnose: on 1 Ont Que 57:118.

Puccinia graminis Pers.: rust, rouille: 0 I on 1 Sask [93, p. 68]; on 3 Que [13, p. 216].

P. koeleriae Arth.: rust, rouille: 0 I on 1, 2, 3 BC [13, p. 325]; on 1, 3 BC [15, p. 149]; on 1 BC 47:112, [535].

Maianthemum Weber

LILIACEAE

Low herbaceous perennials of the northern hemisphere.

1. *M. canadense* Desf., wild lily-of-the-valley, muguet; in Canada from Labr, Nfld and NS to Man. Ia, *M. c.* var. *interius* Fern.; in Canada from BC and Alta to Ont.
2. *M. dilatatum* (Wood) Abrams; Alaska and BC to Idaho and Calif.

Ceratobasidium anceps (Bres. & Syd.) Jackson: on 1 Ont Que [495].

Phoma maianthemii Pk.: on 2 Alaska [175].

Phyllosticta sp.: on 2 Alaska [175].

Puccinia amphigena Diet.: 0 I on 1 Sask [93, p. 65; cf. 15, p. 144].

P. maianthemii Diet.: III on 2 Alaska [175].

P. sessilis Schneid. ex Schroet.: 0 I on *M. sp.* NS 29:76; on 1 Man [93, p. 71], NS [1138; cf. 15, p. 130].

Ramularia subsanguinea (Ell. & Ev.) Savile (*Cercospora s.* Ell. & Ev., *R. rubicunda* Bres.): on 1 Man [93, p. 115]; on 1 Man Que NS, 2 BC [956, p. 205]; on 1a, 2 BC [963]; on 2 Alaska [175].

Uromyces acuminatus Arth. var. *magnatus* (Arth.) Davis: 0 I on 1 Sask [93, p. 72], NS [15, p. 168; 1138].

Malope L.

MALVACEAE

Herbs of the Mediterranean region; one cult. in the flower garden.

1. *M. trifida* Cav., large-flowered mallow wort, fausse mauve; native to Spain and n. Africa.

Fusarium oxysporum Schlecht.: foot rot, pourridié fusarien: on 1 Man 40:25, 42:102, [335].

Malus Mill.

ROSACEAE

Deciduous, rarely half-evergreen, trees or shrubs of the temperate regions of N. America, Europe and Asia; some are important fruit trees and others are cult. for their showy flowers and attractive fruit.

1. \times *M. adstringens* Zobel (*M. baccata* \times *M. pumila*), a major crabapple, including Transcendent Crab.
2. *M. baccata* (L.) Borkh., Siberian crabapple, pomme d'api; n.e. Asia to w. China.
3. *M. fusca* (Raf.) Schneid. (*M. diversifolia* (Bong.) Roem., *M. rivularis* Roem.), crabapple; Alaska and BC to Calif.
4. *M. ioensis* (Wood) Britt., prairie crabapple, pommeter d'Iowa; Minn and Wis to Neb, Kansas and Mo; both ornamental forms and those bearing fruit are cult.
5. *M. pumila* Mill., apple, pommier; small to large deciduous tree of Europe and w. Asia; progenitor of most cult. apples.

Other hosts: 6, *M. angustifolia* (Ait.) Michx. 7, *M. coronaria* (L.) Mill. 8, *M. transitoria* (Batalin) Schneid.

Agrobacterium tumefaciens (Sm. & Towns.) Conn: crown gall, tumeur du collet: on 5 BC Ont 24:23, Sask 50:96, Que 42:75, NB 49:27, NS 32:66, PEI 41:65, [cf. 1138]; occurs sporadically but may occasionally be prevalent in nursery stock BC 55:99, 62:72, Ont 56:98. Crown gall is sometimes accompanied by hairy root, racines hirsutes, caused by *A. rhizogenes* (Riker et al.) Conn, BC 24:23, Ont 56:98.

Alternaria mali Roberts: leaf spot and core rot, alternariose: reported on 5 Man 40:67, Que 42:75, NB 28:37, 40:67, [1138], PEI 52:81. Even if *A. mali* is distinct from *A. tenuis* auct. sensu Wiltshire, the latter fungus must at least occur as a saprophyte on apple [cf. 270].

Armillaria mellea (Vahl ex Fr.) Kummer: armillaria root rot, pourridié-agaric: on 5 BC 20:33, 30:65; a very minor pathogen of apple.

Botryosphaeria obtusa (Schw.) Shoem. (*Physalospora o.* (Schw.) Cke.; stat. conid. *Sphaeropsis malorum* Berk. ex Pk. non Berk.): black rot, pourriture noire: on 2 Sask, 5 Ont Que [996, p. 1298]; reported on 5 Sask 30:59, 31:66, Man-NS 24:22, PEI 32:62, perithecia recorded on 5 NS [1138]; pycnidia noted on 1 Man F54:99; on 2 Man [93, p. 140]; on 5 Man Ont 44:82, NB 53:88. A disease of some importance except in well-cared-for orchards; common after winter injury.

B. stevensii Shoem. (*Physalospora mutila* N.E.Stev.): on 5 as *Sphaeropsis malorum* BC 39:77, as *Physalospora obtusa* BC 44:82, [cf. 996, 1053].

Botrytis cinerea Pers.: gray mold, moisissure grise: common but rarely prevalent as a fruit rot of 5 in storage BC 31:65, [535], Man 48:80, Que 48:76, NB 25:27, 35:49, NS 38:76, [cf. 1138]. Recorded as cause of a leaf spot BC 42:75, and a fruit rot in the orchard BC 50:95, NB 37:54. After *Gloeosporium album*, the most important cause of rot of apples in storage in 1937 in NS 37:54, [cf. 270].

Ciccinobolus cesatii de Bary: on *Podosphaeria clandestina* on 5 Man 44:72, [cf. 93, p. 132].

Cladosporium cladosporioides (Fres.) De Vries (*Hormodendron c.* (Fres.) Sacc.): common on buds and bark of 5 Ont [563].

C. herbarum Lk.: also common on buds and bark of 5 Ont [563]; on leaves Ont 31:64; on blossoms NS 42:75, [cf. 1138].

Clathridium corticola (Fckl.) Shoem. & Müller (stat. conid. *Seimatosporium lichenicola* (Cda.) Shoem. & Müller): as *Metasphaeria leiostega* on dead branches of 2 Man [93, p. 55; 997, p. 405].

Coniothyrium sp.: often isolated from buds and bark of 5 Ont [563].

C. fuckelii Sacc.: on 5 NS [1138]; from end-rot of fruit NS 58:85.

C. pirinum (Sacc.) Sheldon: leaf spot, tache ocellée: on 2 Man 31:116, 42:102, 43:97; on 5 Man 39:82, Ont 31:64.

Corticium laeve Pers. ex Fr.: on branches of 5 Man [93, p. 76].

Coryneum foliicola Fckl.: on 5 Alaska [175]; probably the fungus here reported is *Stigmata negundinis* (q.v.).

C. longistipatum Berl.: on 5 Alaska [175].

Cylindrosporium pomi Brooks (*Phoma pomi* Pass.): fruit spot, tache des fruits: on leaves of 2 Man 44:81; on 2 NB 22:30; under *P. pomi* on 5 NB NS 24:22, NB 29:49, [1138], NS 49:77. The perfect state, *Mycosphaerella pomi* (Pass.) Lindau, is unknown in Canada.

Cytospora spp.: dieback and canker, chancre cytosporéen: on 5 Sask 30:60, Que 34:57, NB 40:67.

C. ambiens Sacc.: on *M. sp.* Man 43:80; 2 Man [93, p. 132]. *C. leucostoma* Sacc.: on 5 Sask 38:74. These fungi usually follow winter injury. *Valsa* spp. (q.v.), the perfect states, may also be present.

Daedalea unicolor Bull. ex Fr.: white rot, carie blanche: on or from 5 Ont Que 53:88, NB 50:115, NS [1138]; see *Acer*.

Daldinia grandis Child: branch rot, pourriture des branches: on 2 Man [93, p. 59]; on 5 Sask 38:74, 45:86. *D. sp.* also reported on 5 Alta 45:86, 46:64.

Diatrype stigma Hoffm. ex Fr.: on 2 Man [93, p. 59].

Diatrypella irregularis Cke. & Ell.: on branches of 2 Man [93].

Erwinia amylovora (Burr.) Winsl. et al. (*Bacillus amylovorus* (Burr.) Trev.): fire blight, brûlure bactérienne: a pathogen endemic on Rosaceae in N. America, which under favorable conditions may occur in epidemic proportions. Spread is often rapid from a few holdover cankers and if the larger limbs become affected, orchard returns may be seriously reduced for several years. Reported on 5 BC-PEI 24:23, 32:61, 41:64; on 2 Man [93, p. 27], Que 36:49; on 2, 8 Man 43:97; on 4 Sask 33:67; on 4 var. *plena* Ont 52:81; on *M. sp.* Alta 62:89, Ont 39:106.

Fire blight was epidemic in BC about 1915, but rigid inspection, removal of very susceptible cultivars, such as Transcendent Crab and Spitzenburg, greatly reduced its incidence, 20:24. Nevertheless, infection was prevalent or serious in other years, 28:39, 36:49, 48:73. Fire blight is also common in Ont and w. Que, where the disease and its control were investigated. In the absence of the very susceptible Alexander, Winter Arbka, Canada Baldwin and certain crabapple cultivars, the disease may be entirely absent, 36:49. The removal of such cultivars from commercial orchards greatly reduced its prevalence, 39:76, but it may still occur in dangerous

amounts, 41:65. As winterhardy varieties were developed in the prairies, fire blight often reached epidemic proportions, first in Man 25:26, [93, p. 27], then Sask 33:45, and finally Alta 42:75, but the disease appears to be declining as the more susceptible strains are replaced by ones with greater resistance Sask 54:106. The pathogen, if present in the Maritime Provinces [1138], is of minor importance for when a determined search was made for the disease only *Sphaeropsis malorum* and *Nectoria galligena* were isolated from the suspected specimens NS 53:88. See also *Pseudomonas syringae*.

Eutypa ludibunda Sacc.: on bark of 2 Man [93, p. 57].

Fabraea maculata Atk. (stat. conid. *Entomosporium maculatum* Lév.): leaf spot, tache entomosporienne: on 3 Alaska [175]; on 5 Ont 57:93.

Fomes connatus (Weinm.) Gill.: on 5 NS [1138].

F. ignarius (L. ex Fr.) Kickx: white rot, carie blanche: on *M. sp.* Que [791], NB NS F54:24; on 5 Ont 24:22, Que 25:27, NS [1138].

Fumago vagans Pers., sensu Fant.: frequently isolated from buds and bark of 5 Ont [563].

Fusarium spp.: associated with fruit rot of 5 in orchard NB 37:54, 39:81, and in trace amounts in storage, 36:52; also fruiting on a canker, 40:67. Isolated were *F. acuminatum* Ell. & Ev. from basal parts of 2, 5 Man; *F. avenaceum* (Fr.) Sacc. from decayed fruit of 5 Man, *F. poae* (Pk.) Wr. from a limb canker NS [335].

Ganoderma applanatum (Pers. ex Wallr.) Pat. (*Fomes applanatus* (Pers. ex Wallr.) Gill.): white mottled rot, carie blanche madrée: on *M. sp.* Que [791]; on 5 BC 38:76, 40:87, NS [1138].

Gelasinospora retispora Cain: from twigs of 5 Que [156].

Gloeodes pomigena (Schw.) Colby (*Phyllachora p.* (Schw.) Sacc.): sooty blotch, tache de suie: on fruit of 5 Ont 22:29, NB 38:77, NS 30:62, [1138], PEI 31:64; rarely observed.

Gloeosporium album Osterw. (*Dasycarpoma allantoidum* (Pk.) Dearn. in litt.): storage rot and canker, anthracnose: on fruit of 5 Ont 48:73, NB 36:52 et seq., [1138], NS 47:83; for several years in both NB and NS considered the principal cause of storage rot, 37:54, [897], but in 1959 *G. malicorticis* was also present [610]; also in cankers NS [610]. Spraying in the current season was effective in controlling the rot in the stored fruit [897]. Von Arx [16] considers that *G. album* is indistinguishable from *Phlyctaena vagabunda* Desm., which is reported in Europe on dead stems of herbaceous plants and on trunks and branches of woody plants. The perfect state, *Pezicula alba* Guthrie, has been described in England 61:88, [610].

Glomerella cingulata (Stonem.) Spauld. & Schrenk (stat. conid. *Gloeosporium fructigenum* Berk., *G. rufomaculans* (Berk.) Thüm. [*Colletotrichum gloeosporioides* Penz.]): bitter rot, pourriture amère: on 5 BC 31:65, [50], Que NB NS 24:22, [cf. 1138]; usually a minor cause of rot in storage NB 40:68; trace infections were recorded of *G. fructigenum*, spore masses grayish, and *G. rufomaculans*, spore masses pink NS 51:85; one culture yielded the perfect state, 46:64. The fungus is regarded by von Arx [16] as a wound parasite, differing from *Colletotrichum gloeosporioides* Penz. only in the virtual lack of setae.

Gonatobotrys simplex Cda.: on twigs of 5 NB 37:53, 38:76, [1138].

Gymnosporangium clavipes (Cke. & Pk.) Cke. & Pk. (*G. germinale* Kern): quince rust, rouille du coignassier: 0 I on 5 Que 31:62, NS 30:60, 56:77, Ont 42:76; on *M. sp.* Man [93, p. 64]; on 1 Ont 36:75,

- Nfld 58:105; on 6 NS [1138]; on *M. floribunda* Ont [828], [cf. 15, 362]. Prevalent on *Juniperus communis* var. *depressa* from e. Ont eastward, and in some seasons affecting up to half the fruit of *M. spp.*, 5 in e. Que. Cultivars differ in susceptibility Que 32:63.
- Gymnosporangium cornutum* Arth. ex Kern: 0 I on 3 BC F57:85, [1199; cf. 15, p. 370].
- G. globosum* Farl.: hawthorn rust, rouille de l'aubépine: 0 only on leaves of 5, 0 I on *Crataegus* Que 35:47; on 5 Ont 61:87, but unconfirmed. Rare on apple, [cf. 15, p. 375].
- G. juniperi-virginianae* Schw.: cedar-apple rust, rouille de Virginie: 0 I on 5 Ont 24:22, sometimes destructive in s.w. Ont 39:77; on leaves and the occasional fruit Ont 55:99; in some seasons causes damage along n. shore of L. Ontario in orchards near *Juniperus virginiana*; on 4 Ont 39:77, [828]; on 5, 7 [15, p. 379]; reported on 5 in NS 23:45, but in error [1138].
- G. nelsoni* Arth.: 0 I on 3 Alaska [15, p. 377; 175].
- G. nootkatense* Arth.: 0 I on 3 Alaska BC [15, p. 357], Alaska [175].
- Hypoxyylon mammatum* (Wahl.) Miller (*H. morsei* Berk. & Curt.): on 2 Man [93, p. 59].
- Hysterium pulicare* (Pers.) Fr.: on 5 Alaska [175].
- Lenzites betulina* (L. ex Fr.) Fr.: on dead wood of 5 NS [1138].
- Leptosphaeria coniothyrium* (Fckl.) Sacc.: on 5 NS [1138].
- Leptothyrium pomi* (Mont. & Fr.) Sacc.: fly speck, moucheture: on 5 Que 59:68, NB 38:77, NS 23:47, PEI 44:81; almost entirely confined to unsprayed trees.
- Monilinia fructicola* (Wint.) Honey (*Sclerotinia americana* (Worm.) Nort. & Ezek., *S. fructicola* (Wint.) Rehm): brown rot, pourriture brune: on fruit of 5 in orchard or storage BC 53:89, Ont 29:47, Que 42:77, NB 26:13, 36:52, NS 38:76, NB NS [1138]; of 1 Man 44:82.
- M. laxa* (Aderh. & Ruhl.) Honey: brown rot, pourriture brune: on 5 BC 57:94.
- Myxosporium corticola* Edg.: surface bark canker, chancre de l'écorce: on 5 BC 62:72, Ont 24:23, Que 25:26. None of these records have been confirmed, but a specimen in DAOM collected in Que appears to be this species, fide Groves; the perfect state, *Pezicula corticola* (Jorg.) Nannf., is unknown in Canada.
- Nectria cinnabarina* Tode ex Fr. (*Creonectria purpurea* (L.) Seav.; stat. conid. *Tubercularia vulgaris* Tode): dieback or coral spot, dépérissement nectrien: on 1 Man 54:81; on 2 Man [93, p. 128]; on 2, 3, 5 Alaska [175]; on 5 BC [50], Que 31:63, NB 34:56, NS 29:47, PEI 33:47; [cf. 1138]; occasionally seen after winter injury, 35:48, 36:51.
- N. coccinea* Pers. ex Fr. var. *faginata* Lohm., Wats. & Ayers: on 5 NS [1138].
- N. galligena* Bres. (stat. conid. *Cylindrocarpon mali* (Allesch.) Wr.): European canker, chancre européen: on 5 BC 22:28, 39:78, [50, 535], Que 35:48, NB 29:47, 53:88, NS 31:64, NB NS [1138]; the conidial states was also noted, NS [1138], 62:72. The fungus is an important pathogen not only of apple but of other broad-leaved trees in the Maritime Provinces.
- Neofabraea malicorticis* Jackson (stat. conid. *Gloeosporium malicorticis* Cordley [*Cryptosporiopsis m.* (Cordley) Nannf.]): anthracnose, anthracnose: cause of canker of 5 BC 24:21 and of a bull's-eye rot of the fruit BC 37:52, NS 61:280. In BC the fungus is prevalent and destructive on Vancouver I. and in coastal BC and has been recorded only at Salmon Arm and Vernon in the BC interior. It was first recognized in NS in 1959. Cultivars differ in their susceptibility.
- N. perennans* Kienholz (stat. conid. *Gloeosporium perennans* Zeller & Childs [*Cryptosporiopsis p.* (Zeller & Childs) Wr.]): perennial canker, chancre pérennant: cause of a canker of 5 BC 25:27, 29:45, and bull's-eye rot, 35:47, 44:82, 59:65. The pathogen is known only from the BC interior. Canker development is entirely dependent on the annual inoculation of the host with the fungus during late summer and autumn, the presence of the woolly apple aphid, *Eriosoma lanigerum* (Hausmann), which carries out the inoculation, and the exposure of the host after inoculation to periods of low temperatures. Other factors, such as winter injury, time of pruning and precipitation, are not essential to its general occurrence [714]. That the presence of the aphid is essential has been clearly demonstrated. When the aphid parasite, *Aphelinus mali* (Haldeman), was introduced in 1929, the aphid and perennial canker both declined, 42:76, 47:83, but under some spray schedules, the aphid rapidly increased and was accompanied by increasing canker development, 48:73. This pathogen is only separated from *N. malicorticis* on very small morphological differences.
- Penicillium ?candidum* Lk.: on fruit of 5 NB 36:52; but see below.
- P. expansum* Lk.: blue-mold rot, moisissure bleue: on fruit of 5 BC 47:84, [535], Sask Man [93, p. 128], Ont Que 42:76, NB 27:38, 40:68, NS 37:54, PEI 40:68, [cf. 1138]; fairly common on apples in storage, [cf. 270].
- Peniophora cinerea* (Fr.) Cke.: on twigs of 5 Que 35:49.
- Phlebia strigosozonata* (Schw.) Lloyd: on 2 Man [93, p. 80].
- Pholiota aurivella* (Batsch. ex Fr.) Kummer (*P. adiposa* auct. Am.): on 5 NS 26:13, [1138].
- P. spectabilis* (Weinm. ex Fr.) Quél.: on 5 NS [1138].
- P. squarrosa* (Pers. ex Fr.) Kummer: on 5 BC 45:86, NS [1138].
- Phomopsis ?mali* Roberts: twig blight, brûlure phomopsienne: on *M. sp.* BC 56:119; on 2 Alaska [175]; on 5 Que 34:57, NB 37:53, NS 39:81; as *Phoma mali* Schulz & Sacc., Man 41:65.
- Phyllosticta limitata* Pk.: leaf spot, tache ocellée: on 5 Alta 40:69, Man 44:82, Ont 31:62, 42:76, Que 24:22, NS 38:78; probably a secondary invader after spray injury or attack by other pathogens.
- P. prunicola* Sacc.: on 5 NS [1138].
- Phytophthora cactorum* (Leb. & Cohn) Schroet.: crown rot, pourridié du collet: one of the most important diseases of 5 in irrigated orchards in the BC interior, first attributed to *Armillaria mellea* (q.v.), 22:30, but later shown to be caused by *P. cactorum*, 39:81, [1148]. The bark tissues below ground are attacked. The disease is favored by almost saturated soil, particularly the subsoil, and high temperatures [1148]. Means of checking the disease in affected trees were developed, 41:66, but about two percent of the mature trees are still affected, 45:87. A search for resistant cultivars and rootstocks was begun in 1941, but many of the rootstocks in current use are susceptible, 61:88. The fruit may be attacked, 55:100. What appears to be the same disease has been reported from Ont 32:65, 49:80, 51:87, 56:101, and NB 57:96, but isolations were not attempted. For the nutritional requirements of the fungus see [611, 782].
- Plenrotus dryinus* (Fr.) Quél. (not *P. subareolatus* Pk.): on 5 NS [1138]; incorrectly as *P. areolatus*, 31:64.

- Podosphaera clandestina* (Wallr. ex Fr.) Lév. (*P. oxycanthae* (DC.) de Bary): powdery mildew, blanc: on 5 Man 44:82. This species may be more widespread on apple than this one record indicates.
- P. leucotricha* (Ell. & Ev.) Salm.: powdery mildew, blanc: on 5 Alaska [175], BC Ont-PEI 24:21, 25:26, 30:61, 31:63, 35:47, 40:69, [cf. 50, 535, 1138]. Powdery mildew continues to be prevalent and sometimes destructive in bearing orchards in the BC interior, where in the absence of scab the trees are rarely sprayed. The disease builds up for several years until during a severe winter infected buds are killed and inoculum is sharply reduced. In E. Canada powdery mildew was confined mostly to nursery stock. However, with the introduction of organic fungicides for the control of scab, it has become prevalent in some bearing orchards Ont 55:100. The addition of a small amount of sulphur to an organic fungicide was beneficial, 57:94.
- Polyporus hirsutus* Wulf. ex Fr.: from *M. sp.* BC [1203].
- P. resinosus* Schrad. ex Fr.: on 5 NS [1138].
- P. tulipiferae* (Schw.) Overh.: on 2 Man [93, p. 84].
- P. varius* Fr.: on 5 NS [1138].
- P. versicolor* L. ex Fr.: on 2 Man [93, p. 84]; on 5 NS [1138].
- Pratylenchus penetrans* (Cobb) Filip. & Stekh.: root-lesion nematode, nématose des racines: on rootstocks of 5 BC 54:106, [535].
- Psathyrella candolleana* (Fr.) A.H.Sm. (*Hypholoma appendiculatum* Bull. ex Fr.): on 5 BC 32:65.
- Pseudomonas syringae* van Hall: blast, coulure bactérienne: on 5 Ont 62:73.
- Radulum quercinum* Fr.: on 5 NS [1138].
- Rhizoctonia solani* Kühn: damping-off, fonte des semis: on 5 in greenhouse NS 49:78.
- Rhizopus nigricans* Ehr.: fruit rot, moisissure chevelue: on 5 NB 35:50, 36:52, NS 37:54; [cf. 1138].
- Schizophyllum commune* Fr.: a common saprophyte, especially after winter injury; on 2 Man [93, p. 95]; on 5 BC 44:82, [535], Alta 40:69, Sask 36:52, Que 34:56, NB NS 35:49, NS [1138].
- Sclerotinia sclerotiorum* (Lib.) de Bary: calyx-end rot, pourriture sclérotique: on fruit of 5 NS 56:99 et seq.; infection is clearly the result of ascospore infection [461].
- Stereum purpureum* (Pers. ex Fr.) Fr.: silver leaf, plomb: on 1 Alta 42:77; on 2 Man [93, p. 78]; on 5 BC Man-PEI 24:21, NS [1138]. In 1909 Güssow [384] observed silver-leaf symptoms on an apple tree at Truro, NS, and later *S. purpureum* was collected on the, then dead, affected branches. Inoculation of the fungus into healthy branches resulted in development of typical silver-leaf symptoms. He also reported finding affected trees of apple, etc., in various localities across Canada from NS to BC. The symptoms may be found on trees that have suffered winter injury, from which they may recover, but where the symptoms are associated with *S. purpureum*, the branch or tree usually dies. Silver-leaf symptoms not associated with *S. purpureum* were noted in Alta Man Que NB NS 44:84, in Que 54:108.
- Stigmata carpophila* (Lév.) M.B.Ellis [278, p. 56] (*Coryneum beijerinckii* Oud.): blight, brûlure corynéenne: on fruits of 5 BC 35:51. Apple is rarely affected, but see below.
- S. negundinis* (Berk. & Curt.) M.B.Ellis [278, p. 44]: on 5 BC 62:73, and known from specimens from BC (DAOM 75728, 37964, 37966), Man (DAOM 71610).
- Trichoderma koningii* Oud.: from roots of 5 NS [1138].
- Trichothecium roseum* (Pers.) Lk. (*Cephalosporium r. Cda.*): pink mold rot, moisissure rose: on 5 BC 55:100, Ont 32:65, Que 33:48, NB PEI 29:45, NS 35:50; a common saprophyte, especially on scab lesions.
- Tympanis conspersa* Fr.: canker, chancre tympanien: the conidial state, *Pleurophomella sp.*, on branch of 5 NS 50:96; on fruit Ont 51:85, [cf. 372].
- Valsa* spp.: canker, chancre cytosporéen: *V. ambiens* (Pers. ex Fr.) Fr. on 2 Man [93, p. 57]; on 5 BC [50]; *V. amphibola* Sacc. on 5 Ont F63:71, NS [1138]; *V. leucostoma* (Pers.) Fr. on 2 Alaska [175], Man [93, p. 58], on 5 BC [50], Sask Que NB 35:49, Man 34:57; see additional records under *Cytospora* spp.
- Venturia inaequalis* (Cke.) Wint. (stat. conid. *Spilocaea pomi* Fr., *Fusicladium dendriticum* (Wallr.) Fckl., *Coniosporium mali* Dearn. & Foster [146; cf. 478, p. 562; 482]): scab, tavelure: on 5 Alaska [175], BC-Nfld 24:20, 25:24, 43:81, 49:xx; on *M. spp.* BC 56:120, Ont 37:75, PEI 54:124. Scab is reported annually from all commercial apple-growing districts in Canada except in parts of the BC interior. Spraying for its control is essential. Until about 1950, NS 50:96, when eradicant fungicides were becoming available, growers were entirely dependent on protectant fungicides. If, for any reason, an early spray application was delayed and trees were unprotected during an infection period, serious losses often occurred. In 1925 in NS 25:24, when wet weather delayed the early applications, the direct loss from scab was estimated at \$750,000. In 1926, 26:12, the crop was about half the normal amount, causing a further loss of \$400,000. In a recent estimate, [200], the annual loss was placed at \$137,000 and \$442,000 were spent to produce a crop valued at \$1,685,000. A cytological study of the ascigerous state revealed that the haploid chromosome number is 7; the nuclear divisions are described [537].
- Apple false-sting virus: false sting, fausse piqûre: on 5 NS 40:71, [457, 458]. Green crinkle on apple in New Zealand is considered by the authors [22] to be closely related to if not identical with false sting.
- Apple flat-limb virus: flat limb, branche aplatie: on 5 cultivar Gravenstein BC NS 38:75, NS [458, 460], Ont 59:69. The disease was known in NS in 1887. What appears to be the same disease was found in Wagener; other cultivars may be symptomless carriers [458].
- Apple leaf-pucker virus: leaf pucker, fronçure des feuilles: on 5 BC 56:101, 59:69, 61:89, 62:74, [1150].
- Apple mosaic virus (pyrus virus 2): mosaic, mosaïque: on leaves of 5 BC NS 38:75, BC 39:80, [1150], Alta 44:83, Ont 45:88, Que 59:70, NB PEI 40:71, NS 35:50, [458]; reported repeatedly in small amounts.
- Apple rubbery-wood virus: rubbery wood, bois caoutchouc: on 5 BC 59:50, [1149]; Lord Lambourne was used as an indicator [1150].
- Apple stem-pitting virus: stem pitting, picature: on trees of 5 on framework of Virginia Crab, etc., BC 55:102, 57:96, [546], Que 56:101; present in BC in almost all orchards that include susceptible cultivars. Evidence of natural spread is very strong. The economic importance of virus diseases is discussed [1150].
- Other virus or viruslike diseases on 5 in BC have been described. Those affecting tree vigor are: decline of Virginia Crab, decline of Hyslop Crab, delayed foliation and dieback of Spartan, mumps, glandes, of Winesap, 56:102, and bark blister of Winesap [1150]. Those affecting the leaves are: chlorotic leaf spot on Russian seedling R12740-7A

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grafted on 5 59:70, crabapple leaf flecking and necrosis [1150]. Those affecting the fruit are: McIntosh fruit-pit and russet, Stayman fruit blotching, 56:102, 61:89, 62:74, ring russetting of Newtown, 61:89, 62:74, ring russetting of Delicious, dark scar of Newtown, dapple apple on Delicious, 62:74, and as mottle, 59:70, flute fruit on crabapple, and sunken blotch [1150]. Also dwarfing, dieback, etc., have been reported on ornamental crabapples in BC 61:104, and crinkle mosaic, mosaïque gaufrée, on 5 in NB 45:88, 46:65.

Boron deficiency, carence de bore: drought spot, corky core and dieback, liège et dépérissement: the three disorders originally reported separately proved to be manifestations of the lack of boron. Serious economic losses were already occurring in the BC interior by 1922, 24:23-24, and they continued to mount until applications of boron were found to cure the disorder. In 1936, when the treatment was introduced, it was estimated that 40,000 boxes of sound fruit were added to the harvest, 36:51, and the next year the annual saving was placed at 500,000 boxes, 37:53. The symptoms of the disorders as they occurred in BC were described by McLarty [713], who proved experimentally that injection of the tree with boron would greatly reduce the incidence of drought spot and corky core [715]. He thus confirmed the results previously obtained in New Zealand [21]. Treatment of the soil every 3 years with 30 lb of boric acid per acre was recommended, 40:72. Cases of boron deficiency are now rare in BC 47:85.

Drought spot and corky core also occur in commercial orchards from Ont eastward, Ont 31:61, Ont Que 39:78, [248], NB 33:47, NS 29:46, PEI 47:85, but the disorders are most noticeable in dry seasons, 46:66. For orchards on alkaline soils, foliage sprays of boron are superior to a soil application in a season when there exist very low soil moisture conditions [249]. Such applications are also effective on very light soils, BC 45:75. For the nutrition of the apple tree, including symptoms of various deficiencies and their correction, see [249]. For the histology of corky core and other physiological disorders, see [626]. Excess boron or its uneven distribution may result in boron toxicity, BC 50:97.

Iron deficiency, carence de fer: chlorosis, chlorose: recorded on 5 BC 38:75, Alta 35:50, Sask Man 54:108; whereas applications of iron salts were ineffective, BC 38:75, iron chelate sprays appear promising in correcting the disorder, BC 57:96, Man 59:71.

Magnesium deficiency, carence de magnésie: leaf blotch, tache irrégulière: reported on 5 BC 50:98, 51:88, [1181], Que NS 54:108, NB 48:76, PEI 43:83. It was first found in 1938 in Que in one of the largest apple-growing centres when heavy leaching rains occurred early in the growing season [456]. It is widespread in the fruit-growing areas of the BC interior. When the deficiency was slight a few leaves showed leaf blotch; when marked, severe defoliation occurred and the apples usually remained small and immature. The disorder was corrected by one or more sprays of magnesium sulphate [1181]. In the hot, dry season of 1960, magnesium deficiency was more evident than usual BC 61:69.

Manganese deficiency, carence de manganèse: interveinal chlorosis, chlorose internervale: on 5 BC 50:98, 51:87, 52:82. Moderate manganese deficiency was first found in BC in 1950 on peach, apple and apricot [1182]. Later it was observed in the s. BC interior on many species of plants including plum, cherry and pear. One or two foliar sprays of manganoous sulphate corrected the disorder [1183].

Nitrogen deficiency, carence d'azote: yellowing, pâleur: on 5 Ont 56:103. This disorder is the first to appear in any undernourished orchard, but it is rapidly corrected by a quickly available nitrogenous fertilizer [cf. 249].

Phosphorus deficiency, carence de phosphore: phosphorus is an important element in apple nutrition and lack of the element produces a variety of symptoms, [249]. This disorder has not been reported to the Survey.

Potassium deficiency, carence de potasse: leaf scorch, pyrolose: although potassium deficiency is considered to be "one of the most common and most serious disorders in Canadian orchards" [249], it has been rarely reported, Ont NB 37:55, Que PEI 41:69, BC 40:72.

Zinc deficiency, carence de zinc: little leaf and rosette, rosette: First recorded on 5 in the BC interior in 1949, 49:80, [1179], it was later found on other tree fruits, 51:88. The symptoms on each species are described. Affected apple trees respond well to zinc sulphate sprays when applied during the late dormant period [1180].

Physiological disorders of uncertain cause, associated with orchard conditions: bitter pit, stippen or tree pit, point amer: on 5 BC Ont NS 24:23, Que 31:65, NB 32:66, NS 29:46; prevalent and severe in 1939 on apples still on the tree in parts of Ont 39:80. Bitter pit occurs frequently on late-maturing cultivars such as Northern Spy, Baldwin and Baxter. Remedial measures are of a general character [249]. It continues to be of some importance on late-maturing varieties. Water core, cœur aqueux, on 5 BC 40:73, BC NS 45:89, Ont 53:92, Que 30:61, Que NB 36:51, [cf. 270].

Physiological disorders of uncertain cause associated with storage conditions: a wide variety of such conditions have been recognized [270]. A few have been noticed: storage scald, échaudage d'entrepot, Que 57:96, NB 61:90, 62:75; storage breakdown, blettissement d'entrepot, BC NS 29:46, BC 34:56, Que 57:96.

Jonathan spot, tache de Jonathan: a physiologic disorder of the fruit BC 32:66, Ont 50:98, NB 29:46, [cf. 270].

Injury caused by the weather: (a) Frost, gelée, on leaves, BC 31:63, Ont 56:102, NB 36:53, NS 27:38, 30:60; on blossoms, NB 38:78, NS 32:66; on fruit, BC 30:61, Ont 57:96, Que 62:74; injury to blossoms is of rather common occurrence in NB and NS. (b) Freezing injury to fruit in storage, PEI 52:82. (c) Hail, grêle, on fruit, BC 33:48, Que 38:77, NB 39:81, NS 32:67. (d) Sun scald, insolation, on fruit in orchard, BC Ont 31:15, Que 44:64, NB 37:55, NS 35:50. (e) Winter injury, gelure, of trees, BC PEI 24:24, NS 25:27; severe in Ont and Que 1933-34, 34:58; rather severe in Ont and NB in 1947-48, 48:78; severe in Que in 1956-57, 57:96.

Chemical injury: from (a) ammonia gas on stored apples, Que 62:74; (b) fertilizer, Ont 38:77, NB 40:72, NS 37:55; (c) fungicides, Ont 40:72, Que NB NS PEI 29:82, NB 35:50, 61:90, NS 25:28; (d) herbicides, BC 49:80; (e) insecticides, BC 42:79, Ont 35:50, PEI 46:66.

Malva L.

MALVACEAE

Annual, biennial or perennial herbs of Eurasia and n. Africa, cult in the flower garden and border; several naturalized in e. N. America.

1. *M. moschata* L., musk mallow, mauve

musquée; native to Europe; cult. and escaped in Canada from Nfld to Ont.

2. *M. neglecta* Wallr., cheese, armour; naturalized from Europe in NB and Man and in BC.
3. *M. pusilla* Sm. (*M. rotundifolia* L.), dwarf mallow, petite mauve; naturalized from Europe, PEI to BC; records on 3 may actually concern 2.

Cercospora althaeina Sacc.: leaf spot, tache des feuilles: on 3 Que 25:80; probably confused with *C. malvarum* (q.v.), [cf. 190].

C. malvarum Sacc.: on 3 Man [93, p. 114].

Colletotrichum sp.: anthracnose, anthracnose: on 2 Ont 56:129.

Puccinia malvacearum Bert. ex Mart.: rust, rouille: III on *M. sp.* cult. Man 33:71, Que 32:103; on *M. sp.* cult. 3 Man 34:104, [93, p. 69]; on 1, 2, 3 Ont [828]; on 1, 3 Ont [15, p. 240]; on 2 BC [535]; on 2, 3 NS [1138]; on 3 Que 24:59, NS 29:76.

Septoria heterochroa Desm.: on 3 Man 24:80; but see below.

S. malvicola Ell. & Martin: leaf spot, tache septorienne: on 3 Man [93, p. 138], Ont NB 33:115, Que 32:103.

Matricaria L.

COMPOSITAE

Annual, biennial or perennial herbs mainly of S. Africa, the Mediterranean region and the Orient; some cult. as ornamentals.

1. *M. ambigua* (Ledeb.) Kryl. (*M. inodora* L., sensu lat.); Alaska, across arctic Canada and Greenl.
2. *M. maritima* L., barnyard daisy; mostly 2a, *M. m.* var. *agrestis* (Knaf.) Wilmott (*M. inodora*), adventive from Europe; in Canada from Nfld and NS to Ont.
3. *M. matricarioides* (Less.) Porter, pineapple weed; naturalized from w. N. America; in Canada from Nfld and NS to Man.

Heteropatella umbilicata (Pers. ex Fr.) Jaap (*Septoria caudata* Karst.): on 1 Frank [600].

Phoma herbarum West.: on 1 Frank [600].

Sphaerotheca fuliginea (Schlecht. ex Fr.) Poll. (*S. macularis* (Fr.) Magn. var. *f.* (Fr.) W.B.Cke.): on 3 Alaska [175].

Aster yellows virus: aster yellows, jaunisse de l'aster: on *M. sp.* cult., 3 NS 60:99; on 3 NS 31:122.

Matthiola R.Br.

CRUCIFERAE

Annual and perennial herbs or subshrubs of the Old World; one cult. commonly in flower gardens and by florists.

1. *M. incana* R.Br., stock, giroflée; native to Europe; widely cult 1a, *M. i.* var. *annua* Voss, ten weeks stock, giroflée annuelle.

Alternaria raphani Groves & Skolko: leaf spot, tache alternarienne: on 1 Que 53:119.

Botrytis cinerea Pers.: gray mold, moisissure grise: on *M. sp.* Que 31:115; on 1 BC 53:119; on 1a Alaska [175].

Erysiphe polygoni DC. ex Méral: powdery mildew, blanc: on *M. sp.* BC 38:105, [50].

Fusarium spp.: from 1: *F. avenaceum* (Fr.) Sacc. from basal parts affected by foot rot and wilt, pourridié fusarien, Ont Que 36:84, [335], but primary cause was probably *Xanthomonas incanae* (q.v.); *F. oxysporum* Schlecht. var. *redolens* (Wr.) Gordon, *F. solani* (Mart.) App. & Wr. from diseased basal parts Man [335]; *F. solani* was also associated with foot rot Man, 40:95, Que, 61:115.

Rhizoctonia solani Kühn: reported to be the cause of damping-off, fonte de semis, of 1 BC 50:128, NS 39:105; and stem rot, rhizoctone commun, Sask 32:96, Man 57:127, Ont 41:95, PEI 51:115.

Sclerotinia sclerotiorum (Lib.) de Bary: sclerotinia rot, flétrissure sclérotique: on *M. sp.* in greenhouse Ont 43:111, 57:127; in garden Alta 37:84; *S. sp.* on *M. sp.* NB 26:36.

Xanthomonas incanae (Kendr. & Baker) Starr et al.: bacterial blight, brûlure bactérienne: on *M. sp.* Ont 42:103.

Aster yellows virus: aster yellows, jaunisse de l'aster: on *M. sp.* NB 35:73, 37:84, NS 60:99; on 1 NB 47:112.

Mecanopsis Vig.

PAPAVERACEAE

Annual or perennial herbs of northern and extra-tropical regions, mostly in Asia; suitable for borders and rock gardens.

1. *M. betonicifolia* Franch, native of Yunnan. 1a, *M. b.* var. *baileyi* Edwards, Tibetan poppy, pavot du Tibet, the form in cult. from Tibet.

Xanthomonas papavericola (Bryan & McWhort.) Dowson: bacterial blight, brûlure bactérienne: on 1a BC 38:105, [535].

Medicago L.

LEGUMINOSAE

Annual or perennial, mostly herbaceous plants of Europe, Asia and Africa; mostly weedy plants but some grown for forage.

1. *M. falcata* L. (*M. media* Pers.), yellow lucerne, luzerne jaune; in Canada from Que to Man; adventive from Europe.
2. *M. lupulina* L., black medick, minette; naturalized from Europe; a weedy annual widespread in Canada.
3. *M. sativa* L., alfalfa, luzerne; widely cult. and more or less naturalized; introduced from the Old World.

Other host: 4, *M. glutinosa* M.B.

Agrobacterium tumefaciens (Sm. & Towns.) Conn: crown gall, tumeur du collet: on 1 Sask 47:22; on 3 Alta 40:19.

Medicago

Alternaria consortialis (Thüm.) Groves & Hughes: from seed of 3 Alta [374].

A. tenuis auct. sensu Wiltshire: from seed of 3 Ont [374].

Ascochyta imperfecta Pk.: black stem, tige noire: on 1 Alta [213]; on 1, 3 and hybrids of 1 and 3 Alaska [175]; on 3 BC 43:17, BC Alta Sask NS 38:18, Sask Man [93, p. 131], Ont 45:22, Que 40:18, NB 60:55, [cf. 1138]; seed infection is common BC-Ont [213], Sask Ont [374]. It may also be isolated from the soil, [213], but it is not an important root rot pathogen; from roots of 3 Man [679].

A. imperfecta is primarily a parasite of stems and leaves of alfalfa, [213]. The disease is widespread, particularly in seed-growing areas of Alta, Sask and Man; damage may be appreciable from heavy infection of young shoots early in the season and yields of seed may be reduced by heavy infection of pedicels and pods of a maturing crop. Burning old plant debris sharply reduced subsequent infection, Sask 46:17, Man 51:21. Seed treatment improved the stand of legumes, particularly of alfalfa and red clover, but it was ineffective against postemergence blight [720].

Culture studies showed that humidities of 80 to nearly 100% were required for pycnidium development. Thus field observations were confirmed: formation of pycnidia and release of spores is dependent on rainfall. Black stem symptoms appear in the fall and mature pycnidia develop mostly in early spring on dead overwintered stems [721].

Isolates of *A. imperfecta* from alfalfa seed from BC-Ont differed in their pathogenicity on 1, 3, etc. Some specificity in pathogenicity was evident [723]. The isolates differed in their utilization of nutrients [722]. No worthwhile resistance to *A. imperfecta* was found in 42 cultivars or lines of 3, six of 1 and one of 4, 59:26.

Aureobasidium pullulans (de Bary) Arn.: from seed of 3 Sask [374].

Low-temperature basidiomycete, basidiomycète frigophile: winter crown rot or snow mold, pourridié hivernal: on 3 Alta 41:17, Sask 42:18, Man 51:21; first reported in 1941 [127]. The disease is widespread and often of major importance in central Alta and n. Alta, and n. Sask, where up to 50% of the plants may be killed. The fungus has also been isolated from diseased specimens from BC and Man. *Trifolium* and *Melilotus* as well as forage grasses are damaged [215]; also on grasses from Alaska [592]. Most of the commonly grown cultivars of 3 are very susceptible; only 1 is highly resistant 44:21, [217]. The cult. plants *Fragaria chiloensis*, *Pastinaca sativa*, *Iris germanica* and *Tulipa* and many weeds proved highly susceptible [216].

Of the chemicals tested for the control of snow mold in Alta, inorganic mercury salts provided the best control, mercuric chloride being more effective on alfalfa than mercurous chloride. Boron was also effective but it has a very low margin of safety. Cheaper chemicals are needed [590].

In 1953 the fungus was found to produce hydrogen cyanide in concentrations sufficient to kill bud and crown tissues of alfalfa plants [591]. Since then its physiology has been studied intensively [589]. Although other organisms will produce snow mold damage, none synthesized HCN in culture or in plant tissues [218]. Recently crude enzyme preparations of the fungus were found to exhibit β -glycosidase activity. HCN was released in appreciable amounts when these preparations were mixed with a tissue filtrate of 3, but not with that of 1 [196].

Botrytis cinerea Pers.: gray mold, moisissure grise: on

blossoms of 3 PEI 36:14; frequently isolated from diseased roots of 3 in Alta along with *Cylindrocarpon ehrenbergii* [214].

Cephalosporium sp.: from roots of 3 Man [679].

Cercospora zebrina Pass.: leaf spot, rayure nervale: on 3 Man 55:32, 56:27, 57:30.

Chaetomium spp.: from seed of 3: *C. chochliodes* Pall., Alta, *C. elatum* Kze. & Schm., Man [374].

Cladosporium spp.: from seed of 3: *C. cladosporioides* (Fres.) De Vries, *C. malorum* Ruehle, Sask [374].

Colletotrichum destructivum O'Gara: anthracnose, anthracnose: on 3 Ont 52:24, Que 50:26, 51:21, 53:33.

Corynebacterium insidiosum (McCull.) Jensen: bacterial wilt, flétrissure bactérienne: on 3 BC 36:16, 40:18, Alta in irrigated fields, 39:24, nonirrigated, 43:17, in the Peace River district, 47:53, Sask 46:18, Man 45:23, Ont 48:17, 49:20, Que 50:26; not of major importance in E. Canada, 53:31. Apparently introduced into Alta only a few years before first observed, as Grimm, almost the only cultivar then grown, is highly susceptible 39:24; marked cultivar differences noted Alta 45:83, Que 59:25. Bacterial wilt sharply reduced yield of hay from Grimm alfalfa in the rotation plots at Lethbridge, whereas the yields from wilt-resistant cultivars continued high [836].

Occurrence of the bacterium within alfalfa seeds was demonstrated, but the organism does not commonly occur in seed [249]. In testing for resistance, seedlings or root cuttings 7–10 weeks old are excellent. Infected plant material provides a source of inoculum easy to handle and store [220].

Cuscuta sp.: dodder, cuscute: on 3 BC 31:24, 32:25.

Cylindrocarpon spp.: *C. ehrenbergii* Wr. isolated from decayed roots of cult. 3 over much of Alta and also from soil of alfalfa fields; it was the most abundant and most pathogenic species observed. *C. obtusisporium* (Cke. & Harkn.) Wr., *C. olidum* Wr. and *C. radiculicola* Wr. were occasionally isolated; *C. obtusisporium* was slightly pathogenic, *C. olidum* nonpathogenic, and *C. radiculicola* a weak wound parasite [210]. The same species were isolated in Man [679].

C. ehrenbergii Wr., etc.: root rot, pourridié cylindrocarpéen: on 3 Alta 37:15 et seq., Sask Man 51:22, Que 42:17; the second most important pathogen associated with root rot in early spring, 42:17; from roots of 3 Man [679].

Ditylenchus dipsaci (Kühn) Filipjev: stem nematode, nématose des tiges: on 3 Alta 50:30, 51:22; present in a few scattered fields in s. Alta.

Fusarium spp.: root rot, pourridié fusarien: in Alta five species predominated among those isolated from diseased roots of 3: *F. avenaceum* (Fr.) Sacc., *F. arthrosporioides* Sherb. occurred commonly and can cause serious injury in early spring; *F. culmorum* (W.G.Sm.) Sacc. was very virulent during the summer; *F. acuminatum* Ell. & Ev., *F. poae* (Pk.) Wr. are weak pathogens [211]; first recorded as *F. sp.*, 35:15, then as *F. avenaceum*, 38:18.

Fusarium spp.: isolated from diseased basal parts of 3: *F. acuminatum*, *F. avenaceum*, Alta Sask Man Ont; *F. culmorum*, Alta Ont; *F. oxysporum* Schlecht., Sask Ont; *F. o. var. redolens* (Wr.) Gordon, Sask; *F. poae*, Alta Man; *F. sambucinum* Fckl. var. *coeruleum* Wr., Man; *F. solani* (Mart.) App. & Wr., Ont [335], *F. dimerum* Penz., *F. equiseti* (Cda.) Sacc., *F. meresmoides* Cda., *F. sambucinum* f. 6 Wr., Man [679]. From 2: *F. culmorum* Ont [335]. From seeds of 3: *F. avenaceum*, BC, *F. equiseti*, Ont [334].

Humarina testacea (Moug.) Seav.: on old roots and stems of 3 Man [93, p. 36].

Leptosphaeria pratensis Sacc. & Briard (stat. conid. *Stagonospora meliloti* (Lasch) Petr., *Ascochyta medicaginis* Bres.): leaf spot, etc., brûlure du melilot: on 3 BC 47:24, Alta 40:18, Sask 46:19, Man 45:24, Ont 54:33, NB 60:85. Stem blight was observed in the field in s.e. Man and the fungus was isolated from discolored vascular tissue on plants from the inter-lake region, 54:33; from roots of 3 Man [679]. Because *Ascochyta imperfecta* (q.v.) is more prevalent than *Stagonospora meliloti*, it seems likely that the early records of the latter fungus under *Ascochyta meliloti* belong in *A. imperfecta*, Alta 30:29, Sask Man [93, p. 131], NS [1138].

Leptotrochila medicaginis (Fckl.) Schüepp [973, p. 253] (*Pyrenopeziza m.* Fckl., *Pseudopeziza jonesii* Nannf.; stat. conid. *Sporonema phacidioides* Desm.): yellow leaf blotch, tache jaune: on 3 BC 34:19, Alta 39:24, Sask Man 24:15, [93, p. 41], Ont 44:21, Que 32:24, NB 40:85.

Oedocephalum glomerulorum (Bull.) Sacc.: on roots of 3 Man [93, p. 22].

Penicillium verruculosum Peyronel: from seed of 3 Sask [374].

Peronospora trifoliorum de Bary (*P. aestivalis* Syd.): downy mildew, mildiou: on 3 BC-PEI 24:15, 26:7, 30:30, 33:14, [cf. 93, p. 30]. A minor disease on the cultivars usually grown, but Lytton, apparently a selection from Grimm, proved highly susceptible. 33:14, 35:15, and some of the newly introduced cultivars and lines are also quite susceptible BC 48:18, Sask 61:49, Man 56:27.

Phialea cyathoidea Bull. ex Gill.: common on old stems 3 Man [93, p. 41].

Phoma anceps Sacc.: from seed of 3 Alta Sask [374].

Physoderma alfalfae (Pat. & Lagerh.) Karling [538, p. 44] (*Urophlyctis a.* (Pat. & Lagerh.) Magn.): crown wart, tumeur noduleuse: on hybrids of 1 and 3, BC 45:125. This pathogen might prove troublesome if introduced into the cooler parts of E. Canada.

Plenodomus meliloti Dearn. & Sanford [254] (a later homonym of *P. meliloti*, Markova-Letova, with which it has never been compared): brown root rot, pourridié-plénodome: on 3 Alta 28:27, 29:19, 33:115, Alta Sask [925], Sask 42:17, Yukon 52:25, NS 31:24; from roots of 3 Man [679]. Alfalfa was severely damaged whereas 1 was only slightly affected Yukon 52:25. *P. meliloti* and *Sclerotinia sativa* (q.v.) are destructive root-rotting pathogens of 3 and *Melilotus* (q.v.) in Alta after the winter dormancy period. Both pathogens are capable of penetrating uninjured roots. They kill the root tissues and retard wound-cork development in advance of the hyphae. Advance of both fungi is checked when the host begins to grow in the spring [209].

Pleospora herbarum (Pers. ex Fr.) Rabh. (stat. conid. *Stemphylium botryosum*, q.v.): conidia are first to be formed after inoculation with either ascospores or conidia [680].

Pseudomonas medicaginis Sackett: bacterial stem blight, brûlure bactérienne des tiges: on 3 BC 31:23, Alta 30:29, 52:25; a rare disease.

Pseudopeziza trifolii (Biv.-Bern. ex Fr.) Fckl. f. sp. *medicaginis-lupulinae* Schmiedeknecht (*P. medicaginis* (Lib.) Sacc. p.p.): on 2 NS 42:18, 51:23.

P. trifolii f. sp. *medicaginis-sativae* Schmiedeknecht (*P. medicaginis*, p.p.): common leaf spot, tache commune: on 3 BC-PEI 24:15, BC Que 33:115, Nfld 57:30, [cf. 93, p. 41]; on 1 Man 38:17. An exceedingly abundant fungus, heavy on cover crops BC 31:23, Ont 29:19, and it may cause severe

defoliation in moist seasons or when cutting is delayed.

Pseudoplea trifolii (Rostr.) Petr. (*Pleosphaerulina briosiana* Pall.): pepper spot, tacheture noire: on 3 BC 42:18, [50], Man 24:15, 55:33, [93, p. 53], NS [1138]. According to McDonald [680], the fungus is homothallic and possesses no conidial state. Useful techniques for ascospore production and inoculation of alfalfa were developed [683].

Pyrenochaeta terrestris (Hansen) Gorenz, Walker & Larson: from roots of 3 Man [679].

Rhizoctonia crocorum (Pers.) DC.: violet root rot, rhizoctone violet: on roots of 3 Alta 31:24; rare on this host.

R. solani Kühn, *Fusarium acuminatum*, *F. avenaceum* and *Ascochyta imperfecta*: crown bud rot, pourridié du collet: These organisms alone or more often in combination cause crown bud rot of 3 under irrigation in the second year or older in s. Alta. *F. roseum* Lk. is the common isolate until the third year when *R. solani* is equally prevalent. *A. imperfecta* is most common in spring, *F. roseum* through the season, and *R. solani* in summer [428]. Histological changes brought about by these organisms have been described and illustrated [429]. On 3 Alta 50:29, 51:23 et seq, BC 59:26, BC Alta Sask 62:38; from roots of 3 Man [679]. A similar disease occurs in Man 45:24, Ont 56:28.

R. solani: root rot, rhizoctone commun: on 3 BC 57:30, Alta Man 44:21, Man 43:18; frequently isolated from roots of 3 Man [679].

Sclerotinia sativa Drayton & Groves [266, p. 526]: root rot, pourridié sclérotique: on 3 Alta 31:23, 44:21, Sask 43:20; occasionally isolated from slightly diseased roots of 3 in Alta [214]; active only in early spring [209].

S. sclerotiorum (Lib.) de Bary: stem rot, pourriture sclérotique: causes a root rot of 3 Alta, but only in warm weather [214]; reported on 3 BC Alta Ont 28:27, BC 50:29, Alta 39:19, Sask 52:26, Man [93, p. 42], NS 45:25.

S. trifoliorum Erikss.: sclerotinia wilt, flétrissure sclérotique: unknown in Alta [214], but known on 3 Ont 46:20, (DAOM 18621); recorded in other provinces, e.g. BC 24:15, [535], but none of the records have been confirmed.

The careful studies of Cormack [209, 214] leave no doubt that *S. sativa*, *S. sclerotiorum*, *S. trifoliorum* and *S. minor* Jagger are distinct from each other, differing in their pathogenicity and behavior in culture. The arguments for this view, 55:58, contrary to that of Purdy [861], who would unite them all under *S. sclerotiorum*, have been recorded. The two species that are similar in most respects are *S. trifoliorum* and *S. sclerotiorum*, but Yarwood (in litt.) notes that they differ in ascospore size. *S. trifoliorum* is less pathogenic to carrot and has a significantly lower optimum temperature than *S. sclerotiorum* and, most important, when the two species were paired and examined microscopically, the two mycelia formed anastomoses but the fusions always died.

Stemphylium botryosum Wallr.: leaf spot, tache stemphylienne: on 3 BC 40:20, Alta 56:28, Sask Nfld 51:31, Man 55:34, Ont 53:34, Que 48:18, NB 60:85, NS [1138]; occasionally prevalent BC 40:20, and even destructive Ont [63]. Mature perithecia of *Pleospora herbarum* (q.v.) were produced from isolates of *S. botryosum* on sterile alfalfa leaves, etc., 55:34. McDonald [680] showed that the fungus is very different from *Pseudoplea trifolii* (q.v.).

Trichoderma viride Pers.: from seed of 3 Alta [374].

Typhula ?trifolii Rostr.: isolate from 3 Ont severely

Medicago

infected 90 percent of Grimm plants under controlled conditions [218].

Uromyces striatus Schroet. (*U. medicaginis* Pass.): rust, rouille: II III on 2 Ont [15, p. 299], associated with 0 I on *Euphorbia cyparissias* Ont 47:24, Ont Que [829]; on 3 Sask 47:24, Man 31:24, [93, p. 73], Ont 24:15, 33:115, [828], PEI 30:30, [1138]. Its occurrence, distribution and life history were studied by Parmelee [829]. It is distinguishable by slight differences in the II and III spores from the closely related species *U. pisi* (DC.) Otth, which is unknown in N. America; an introduced rust.

Alfalfa mosaic virus (medicago virus 2): mosaic, mosaïque: on 3 BC 44:21, Alta 34:19, Man 58:32, Ont 54:35, NB 42:19, 44:21, PEI 45:25.

Alfalfa witches'-broom virus: witches'-broom, virose-balai de sorcière: on 3 BC 32:25, 42:19, Alta 40:20 et seq., Sask 46:20. A high infection was recorded in the Kamloops area, BC 53:34, but later it appeared to be less prevalent, 56:29.

Aster yellows virus (callistephus virus 1): aster yellows, jaunisse de l'aster: on 3 Man 57:31; the only report.

Clover yellow mosaic virus: found in 3 BC, but this host was not infected by white clover mosaic virus [860].

Tobacco ring-spot virus: ring spot, tache annulaire: on 3 Ont 54:35; only report.

Chemical injury: from sulphur dioxide: on 3 BC 28:27.

Boron deficiency, carence de bore: yellows, jaunissure: on 3 BC 37:15, 44:22, 46:20, ?Ont 49:22, Que 49:22, 53:31, NS 53:34, PEI 40:20; affected fields were almost exclusively limited to gravelly or sandy soils Que 52:27. Sulphur deficiency may be another cause of yellowing Sask 50:29. The abnormalities caused by the lack of boron in the histology of stems and leaves of 3 in the field and greenhouse are described [580]. The value of soil and plant analyses as a means of diagnosing boron deficiency of alfalfa in Que is reported [808].

Phosphorus deficiency, carence de phosphore: stunt, rabougisement: on 3 Ont 53:34.

Potassium deficiency, carence de potasse: marginal chlorosis, chlorose marginale: on 3 Alta 57:21, Que 62:39, PEI 41:17.

White spot, tache blanche: physiological, physiologique: on 3 BC Man PEI 24:15, Alta 40:20, Sask 61:50, Man 53:34, Ont 37:15, Que 30:30; attributed to excessive moisture in several instances.

Winter injury, gelure: physiological, physiologique: on 3 Alta Que 51:24, Alta 56:29, Sask Nfld 50:29, Ont 27:27, PEI 40:20.

Leafhopper injury: on 3 Man 55:34, Que 50:29; the symptoms are distinct from those of boron deficiency, 50:29.

Melampyrum L. SCROPHULARIACEAE

Annual herbs of the northern hemisphere.

1. *M. lineare* Desr., cow wheat; in Canada from Labr, Nfld and NS to Alta and BC.

Cronartium coleosporioides Arth.: II III on 1 Ont [828], Que [853; cf. 15, p. 29]; on 1 Sask and by inoculation with aeciospores of *Peridermium stalactiforme* Arth. & Kern [1195]; on 1 under immature stands of *Pinus contorta* affected by stalactiform aecia, BC F63:125.

Puccinia andropogonis Schw.: 0 I on 1 Ont [15, p. 121], NS [1138].

Melica L.

GRAMINEAE

Perennial grasses of temperate regions.

1. *M. subulata* (Griseb.) Scribn., Alaska to Calif and Wyo.

Erysiphe graminis DC. ex Méral: on 1 BC [1199].

Melilotus Mill.

LEGUMINOSAE

Annual or biennial sweet-smelling herbs of the Old World; cult. for forage and green manuring.

1. *M. alba* Desr., white sweet clover, trèfle d'odeur blanc; native to Eurasia, naturalized in N. America.
2. *M. officinalis* (L.) Lam., yellow sweet clover, trèfle d'odeur jaune; native to Eurasia, naturalized in N. America.

Aphanomyces euteiches Drechsl.: root rot, pourridié: on 1 Ont 50:31.

Ascochyta caulicola Laub.: gray stem canker, chancre grise: on *M. spp.* Alta Sask 24:20, Alta Man 38:20, Sask 56:30, Man 41:18, 54:37; on 1 Alta 46:22, Sask 24:20, on 2 Alta 39:27, 46:22, Sask 24:20; 2 appears to be more susceptible than 1.

A. imperfecta Pk.: recorded once as the cause of root rot BC 61:51; isolated occasionally from blackened stems of 1, 2, but the predominant pathogen was *A. lethalis* (q.v.) [213].

A. meliloti (Trel.) Davis (a later homonym of *A. meliloti* Trusova, *A. lethalis* auct. non Ell. & Barth.): black stem or spring black stem, tige noire ascochy-tique: on *M. spp.* Alta 40:21, Sask 49:22, Man 45:27; on 1, 2 Alta 46:22, Ont 48:19. The perfect state, *Mycosphaerella lethalis* Stone, has been recorded on *Trifolium* (q.v.) in Canada. Early records of *A. meliloti* are omitted, as no authentic Canadian specimens were known until after 1938, 38:20.

Low-temperature basidiomycete, basidiomycète frigophile: winter crown rot, pourridié hivernal: *M. spp.* highly susceptible [217]; severe damage may be caused in Alta [215]; on *M. spp.* Alta 55:37, 56:31; from 1 Yukon [592].

Botrytis cinerea Pers.: cause of a stem rot of *M. sp.* BC 24:20.

Cercospora davisii Ell. & Ev.: leaf spot and summer black stem, tige noire cercosporéenne: on both leaves and stems of *M. spp.* Man 55:37, 57:33. A severe infection appeared to limit seed production Man 54:37; on 1 Man [93, p. 114], Ont 51:26. Probably more widely distributed than the records show, because it may have been confused with spring black stem, 54:37.

Coniothyrium olivaceum Bon.: from seed of *M. sp.* Sask 46:22.

Cylindrocarpus spp.: root rot, chancre des racines: *C. ehrenbergii* Wr. was the predominant species from roots of *M. spp.* in Alta and also known from Sask. *C. radiculicola* Wr. was less common [210]. On *M. spp.* Alta 37:16, Ont 52:29.

Fusarium spp.: root rot, pourridié fusarien: on *M. spp.* Alta 38:21, Sask 39:27, Man [335], Ont 45:28, NS 41:18. In Alta the predominant species were *F. acuminatum* Ell. & Ev., *F. arthrosporioides* Sherb.,

F. avenaceum (Fr.) Sacc., *F. culmorum* (W.G.Sm.) Sacc. and *F. poae* (Pk.) Wr. and usually other fungi, such as *Plenodomus meliloti* and *Sclerotinia sativa* were also active [211]. The following species were isolated mainly from 1: *F. acuminatum*, *F. avenaceum*, *F. equiseti* (Cda.) Sacc., *F. oxysporum* Schlecht., *F.o. var. redolens* (Wr.) Gordon, *F. poae*, *F. sambucinum* Fckl. var. *coeruleum* Wr., *F. solani* (Mart.) App. & Wr., Man [335]; *F. avenaceum*, *F. oxysporum*, *F. solani*, Ont 45:28, [335]; *F. avenaceum*, Alta 38:21, 44:23, Sask 42:21; *F. culmorum*, Alta 40:22, Sask 56:30. *F. o. var. redolens* was isolated from blighted seedlings, but the symptoms were not reproduced in greenhouse tests Sask 49:23, [335].

Leptosphaeria pratensis Sacc. & Briard (stat. conid. *Stagonospora meliloti* (Lasch) Petr.): leaf spot, stem blight and root rot, brûlure: on leaves of *M. spp.* BC Alta Sask Man Ont 38:20, Alta 40:22, Sask 36:16, Man 35:17, Ont 53:32; reported as a stem blight Sask 36:16; on 1 BC 33:116, Sask Man [93, p. 141], Ont 54:38, Que 55:37; on 2 Alta 47:26, Sask 33:116, Man [93], Ont 48:19.

Ophiobolus porphyrogonus (Tode) Sacc.: on dead stems of *M. sp.* Man [93, p. 55].

Peronospora trifoliorum de Bary (*P. meliloti* Syd.): downy mildew, mildiou: on *M. spp.* BC 38:21, Alta 35:17, Sask 51:26; on 1 BC [535].

Phialea cyathoides Bull. ex Gill.: on old stems of *M. sp.* Man [93, p. 41].

Phytophthora cactorum (Leb. & Cohn) Schroet.: root rot, pourridié phytophthoréen: on *M. spp.* Alta 39:27, Sask 42:21; on 1, 2 Ont 49:19. The disease has rarely been destructive in Alta 39:27, or Sask 58:34, but isolates of the fungus proved highly pathogenic in tests [212]. This pathogen was considered the cause of failure of sweet clover stands in s.w. Ont [64, 1016]. From Hildebrand's study [445, p. 952], it seems possible that more than one species of *Phytophthora* may be present.

Plenodomus meliloti Dearn. & Sanford [254]: brown root rot, pourridié-plénodome: on *M. spp.* Alta Sask 29:21, [925]; type collected on 1 at Saskatoon, Sask, in 1926 [925]; on 1, 2 Yukon 32:29. One of the important cool-temperature organisms, the damage occurring during the winter and early spring [925].

Pleospora ?calvescens (Fr.) Tul. (*Pyrenophora c.* (Fr.) Sacc.): on dead stems of *M. sp.* Man [93, p. 56].

Pseudopeziza trifolii (Biv.-Bern. ex Fr.) Fckl. f. sp. *meliloti* (Syd.) Schüepp [973, p. 229] (*P. meliloti* Syd., *P. medicaginis* (Lib.) Sacc.): leaf spot, tache commune: first noticed on *M. sp.* Man 34:21; on 1 Alta 41:19, Man [93, p. 41]; on 1, 2 Ont 48:19; now rather prevalent Man 57:33, Sask 58:34.

Pythium spp.: damping-off, fonte des semis: an important factor in the failure of *M. spp.*, causing a mild to severe reduction of stands in s.w. Ont [1016]. *P. debaryanum* Hesse and *P. ultimum* Trow were isolated from seedlings that failed to emerge [1016]; from a crop of 1, *P. irregulare* Buisman and *P. ultimum* were also isolated, 50:32.

Rhizoctonia solani Kühn: seedling blight and root rot, rhizoctone commun: in seedling blight Sask 46:22, Ont 50:32, [65]; in root rot Man 41:19. Although it was considered the most widespread and destructive disease of *Melilotus* in Man in 1945, 45:28, the black stem diseases now appear to be the more important.

Sclerotinia sativa Drayton & Groves: sclerotinia root rot, pourridié sclérotique: on 1, 2 Alta [266, p. 526]; a destructive root-rot pathogen of *M. spp.* in Alta, Sask after the winter dormancy period, 43:20, [209]; on *M. spp.* Alta 33:16, Sask 43:20.

S. sclerotiorum (Lib.) de Bary: sclerotinia stem rot, pourriture sclérotique: not uncommon on *M. spp.* in Alta 29:21, but mainly in warm weather [214]; on *M. spp.* Sask 50:32.

S. trifoliorum Erikss.: sclerotinia wilt, flétrissure sclérotique: unknown in Alta [214]; known on *Medicago* and *Trifolium* in Ont and recorded on *M. sp.* BC 30:32; 1 BC [535], Ont 48:20,, but the records are not well documented.

Scopulariopsis stercoraria (Lk.) Hughes (*S. brevicaulis* (Sacc.) Bain.): on moldy *M. spp.* Man [93, p. 126].

Thielaviopsis basicola (Berk. & Br.) Ferr.: black root rot, pourridié noir: on *M. sp.* Ont 50:32.

Alfalfa witches'-broom virus: witches'-broom, virose-balai de sorcière: on *M. spp.* BC 47:26, Alta 40:22, 41:19; uncommon.

Aster yellows virus (callistephus virus 1): aster yellows, jaunisse de l'aster: on *M. sp.* Man NS 57:33.

Bean yellow mosaic virus (bean mosaic virus 2, sweet clover mosaic virus): mosaic, mosaïque: on *M. spp.* BC 23:42, [712], Alta 31:27, Sask 40:22, Man 23:42, 55:37, Ont 30:32, 48:20; other viruses may be present but they have not been studied Ont 53:32.

Clover yellow mosaic virus and white clover mosaic virus: naturally occurring mixtures of these viruses were found in *M. spp.* in ?BC [860].

Chemical injury: from 2,4-D on *M. spp.* Sask 52:29.

Melissa L.

LABIATAE

Perennial herbs of the Mediterranean region and central Asia; a single species in cult.; used in seasoning particularly in liqueurs.

1. *M. officinalis* L., lemon balm or bee balm, citronelle.

Botrytis cinerea Pers.: on *M. sp.* Alaska [175].

Menispermum L.

MENISPERMACEAE

Twining vines, one species in N. America and the other in e. Asia.

1. *M. canadense* L., common moonseed, raisin de couleure; in Canada from w. Que to Man.

Cercospora menispermii Ell. & Holw.: on 1 Man [93, p. 115].

Diplodia sarmentorum Fr.: on dead stems of 1 Man [93, p. 133].

Entyloma menispermii Farl. & Trel.: on 1 Alta Man Ont [292], Man [93, p. 61]. Filiform and sickle-shaped conidia are present in this species [410]. Its reported occurrence in Alta seems to be in error.

Phyllosticta abortiva Ell. & Kell.: on leaves of 1 Man [93, p. 135].

Sphaeropsis menispermii Pk.: on stems of 1 Man [93, p. 140].

Valsa ?menispermii Ell. & Holw.: on old stems of 1 Man [93, p. 58].

Mentha L.

LABIATAE

Aromatic perennial herbs of the temperate region; mostly adventive or naturalized from

Mentha

Europe; cult. to some extent for the aromatic essential oil in the plants.

1. *M. arvensis* L., field mint, baume; circum-polar; in Canada from Nfld and NS to BC. 1a, *M. a.* var. *villosa* (Benth.) S.R.Stewart (*M. canadensis* L., *M. a.* var. *canadensis* (L.) Briq.), in Nfld and from NS to Alaska. 1b, *M. a.* var. *villosa* f. *glabrata* (Benth.) S.R. Stewart (*M. glabrior* (Hook.) Rydb.), in Canada in Labr and from NS to BC.
2. *M. piperita* L., peppermint, menthe poivrée; introduced from Europe, widespread.
3. *M. spicata* L., spearmint, baume vert; introduced from Europe, widespread.

Darluca filum (Biv.-Bern.) Cast.: on *P. menthae* on 2 Que 54:43.

Erysiphe cichoracearum DC. ex Mérat: on 1a Man [93, p. 44].

E. galeopsidis DC. ex Mérat: probably this species on 1b Man [93].

Gibberidea abundans (Dobr.) Shear (*Naumovia a.* Dobr.): on *M. sp.* NS [988, p. 359].

Mollisia patrocineria (Cke.) Phill.: on old stems of *M. sp.* Man [93, p. 40].

Peronospora stigmaticola Raunkiaer: on 1a Ont PEI 51:192, [949].

Puccinia angustata Pk.: 0 I on 1 Ont [828], NS [1138]; on 1 NS, 1a Man [15, p. 194]; on 1a Que 32:103; on 1b Man [93, p. 65].

P. menthae Pers.: rust, rouille: 0 I but mostly II III on 1, 2, 3 BC [535]; on 1 NS, 1a Alta Ont Que NS, 3 Ont [15, p. 328]; on *M. sp.* NB, 1, 1a, 2, 3 NS [1138]; on 1a BC 33:116, Alta 34:104; on 1b Sask Man [93, p. 69]; on 2 BC Que 54:45, Man 44:112, NS 55:48; on 3 BC 51:116, Ont 46:56, 55:48. A common rust on mint and may cause damage in commercial plantings.

Ramularia menthicola Sacc.: on leaves of 1b Man [93, p. 125].

R. variata Davis: on leaves of 1a Man [93].

Septoria menthicola Sacc. & Letend.: leaf spot, tache septorienne: on *M. spp.* Alta Sask Man Que, 2 Man 44:112; on 1b Alta 34:104, Sask 33:116, Man [93, p. 138].

Synchytrium sp.: on 1 BC [541].

Verticillium albo-atrum Reinke & Berth.: wilt, flétrissure verticillienne: on 2 Ont 55:49.

Aster yellows virus (*callistephus virus* 1): aster yellows, jaunisse de l'aster: on 3 NB 54:134.

Menyanthes L.

GENTIANACEAE

A boreal perennial herb, circumboreal.

1. *M. trifoliata* L., buckbean, herbe à canards; Eurasia and w. N. America. 1a, *M. t.* var. *minor* Raf.; Labr, Nfld and from NS to Alaska.

Physoderma menyanthis (de Bary) de Bary (*Cladochytrium m.* (de Bary) de Bary): on 1 Alaska [175], Man [93, p. 29], Greenl [899].

Septoria menyanthis (Lib.) Desm.: on 1 Man [93, p. 138].

Menziesia J.E.Sm.

ERICACEAE

Small deciduous shrubs of N. America and e. Asia; interesting shrubs for the rockery but apparently rare in cult.

1. *M. ferruginea* J.E.Sm.; Alaska to Oregon.

Exobasidium aff. vaccinii Wor.: on *M. sp.*, 1 Alaska [175]; on 1 Alaska [1038], BC [535, 958, 1198].

Melogramma sp.: on 1 Alaska [175].

Microsphaera penicillata (Wallr. ex Fr.) Lév. var. *vaccinii* (Schw.) W.B.Cke.: on 1 Alaska [175].

Rhytisma sp.: on 1 Alaska [175].

R. arbuti Phill. (stat. conid. *Melasmia menziesiae* Dearn. & Barth.): on *M. sp.*, 1 Alaska [175]; on 1 Alaska [1038], BC [1198].

?*Tremella phyllachoroidea* Sacc.: on 1 Alaska [175].

Mertensia Roth

BORAGINACEAE

Perennial herbs of the northern hemisphere, used in borders for their showy flowers.

1. *M. maritima* (L.) S.F.Gray (*Stenhammaria m.* (L.) Reichb.), blue bonnet, sanguine de mer; Greenl to Alaska and s. to Mass, James Bay and BC.
2. ?*M. paniculata* (Ait.) G.Don; Que to Alaska.
3. *M. virginica* (L.) Pers., bluebells; in Canada in s. Ont.

Botrytis cinerea Pers.: gray mold, moisissure grise: on 3 cult. PEI 52:116.

Erysiphe cichoracearum DC. ex Mérat (*E. communis* Wallr. ex Fr.): on *M. sp.* Alaska [175]; on 2 Sask 31:122, Man [93, p. 44].

Heterosporium stenhammariae Rostr.: on 1 Greenl [900, p. 630].

Mycosphaerella tassiana (de Not.) Johans. (*Sphaerella pachyasca* Rostr.): on 1 Mack Frank [604], Greenl [899].

M. tassiana var. *arctica* (Rostr.) Barr: on 1 Frank [52].

M. tassiana var. *arthopyrenioides* (Auersw.) Barr (*Didymosphaeria johansenii* Dearn.): on 1 Alaska [52, 175; 250, p. 8C].

Pleospora helvetica Niessl: on 1 Que [52].

Puccinia mertensiae Pk.: III on 2 Alaska [175; cf. 15, p. 327].

Sphaerella stenhammariae Rostr.: on 1 Greenl [899, p. 574].

Milium L.

GRAMINEAE

Grasses of temperate N. America and Eurasia.

1. *M. effusum* L., in Canada in Nfld and from NS to w. Ont; also in Eurasia.

Puccinia graminis Pers.: II III on 1 Ont [15, p. 174].

Mimulus L.

SCROPHULARIACEAE

Decumbent or erect herbs or sometimes shrubs of N. and S. America, Asia, Australia and S. Africa; a few grown in the flower garden.

1. *M. guttatus* DC., musk flower, herbe au musc; Alaska to Mexico and naturalized in e. US.
2. *M. luteus* L.; Chile.
3. *M. ringens* L., monkey flower; in Canada in NS and from Que to Man.

Botrytis cinerea Pers.: on 2 Alaska [175].

Entyloma clintonianum Zundel & Dunlop: on 1 BC [957].

Septoria mimuli Ell. & Kell.: on 3 Man [93, p. 139].

Mitella L.

SAXIFRAGACEAE

Low slender perennials of N. America and e. Asia.

1. *M. breweri* Gray; BC and Alta to Idaho and Calif.
2. *M. diphylla* L., fairy cup; in Canada in Que and Ont.
3. *M. nuda* L.; Labr, Nfld and NS to Mack.
4. *M. ovalis* Greene; BC to Calif.
5. *M. pentandra* Hook.; Alaska and Alta to Colo and Calif.
6. *M. trifida* Graham; BC and Alta to Calif.

Ceratobasidium anceps (Bres. & Syd.) Jackson: on 3 Ont [495].

Puccinia heucherae (Schw.) Diet., sensu lat.: III on 1 BC, 2 Ont, 3 Alta Sask Ont [15, p. 293]; on 3 Sask Man [93, p. 69], Que 33:116, [8]; on 5 Alaska [175], BC [1198].

P. heucherae var. *astroberingiana* Savile: on 1 BC, 5 Alaska BC, 6 BC [954, p. 40].

P. heucherae var. *heucherae*: on 3 BC Mack Alta Sask Man Ont Que Nfld, 4 BC [954].

Monarda L.

LABIATAE

Aromatic annual or perennial herbs of N. America occasionally grown for their showy flowers.

1. *M. didyma* L., Oswego-tea, thé d'Oswégo; escaped from cult.; in Canada in Ont and Que.
2. *M. fistulosa* L., wild bergamot, menthe de cheval; native to s.w. Que and Ont. 2a, *M. f.* var. *mollis* (L.) Benth. (*M. mollis* L.); in Canada from Que to Sask. 2b, *M. f.* var. *menthaefolia* (Graham) Fern. (*M. menthaefolia* Graham); in Canada from Man to Mack and BC.

Fusarium oxysporum Schlecht.: from apparently healthy roots of 2b Man [335].

Mycosphaerella tassiana (de Not.) Johans.: on 2a BC [50].

Puccinia menthae Pers.: rust, rouille: 0 I II III on *M.* sp. Que 34:80; on *M.* spp., 2 Man, 2b Sask [93, p. 69]; on 1 Ont, 2 Alta Man Ont, 2a Yukon Alta

Man, 2b Alta [15, p. 328]; on 2 cult. Ont 43:11; on 2a BC 33:116, [535], Alta 34:104; on 2b BC 34:105.

Moneses Salisb.

PYROLACEAE

A low perennial herb of N. America and Eurasia.

1. *M. uniflora* (L.) Gray, jockey-club; Labr, Nfld and NS to Alaska and s. to Oregon. 1a, *M. u.* var. *reticulata* (Nutt.) Blake, Alaska and BC to Calif.

Chrysomyxa monesis Ziller: II III on 1 Alaska BC, 1a Alaska [1196, p. 435]; outside the range of *Picea sitchensis*, *Moneses* also carries *C. pirolata*; on 1 Alaska BC [955].

C. pirolata Wint. (*C. pyrolae* (DC.) Rostr. nom. nud.): II III recorded on 1 Alaska Alta Que, 1a Alaska [15, p. 32]; on 1, 1a Alaska [175]; on 1 BC Yukon F62:121; definitely reported on 1 BC [955], Que [947]; on 1 in DAOM from BC Mack Man Que Labr.

Pucciniastrum pyrolae Diet. ex Arth.: II III on 1 Alta [15, p. 16], Mack [827].

Monolepis Schrad.

CHENOPODIACEAE

Annual herbs of w. N. America.

1. *M. nuttalliana* (Roem. & Schult.) Greene, poverty weed; in Canada from Alta to Man.

Albugo bliti (Biv.-Bern.) Kuntze: on 1 Sask Man [93, p. 29].

Monotropa L.

PYROLACEAE

Low fleshy herbs of the northern hemisphere parasitic on roots or growing on decomposing vegetable matter.

1. *M. uniflora* L., Indian pipe; Nfld to Alaska, also in Mexico and Asia.

Colletotrichum dematium (Pers.) Grove: on 1 Ont [827].

Discosia splendida Kirschst.: on dead stems of 1 NS [827, 1138].

Montia L.

PORTULACACEAE

Glabrous annual or perennial herbs, widely dispersed but several species in N. America.

1. *M. cordifolia* (S.Wats.) Pax & K.Hoffm.; BC to Oregon, Calif, Mont and Utah.
2. *M. perfoliata* (Donn.) Howell, Portugese lettuce, pourpier d'hiver; BC to Calif, ND and Ariz.

Peronospora claytoniae Farl.: on 2 BC [970].

Ustilago nelsoniana Savile: on 1 BC [970, p. 585].

Morus L.

MORACEAE

Deciduous trees or shrubs of temperate and subtropical regions of the northern hemisphere.

1. *M. alba* L., white mulberry, mûrier; native to China, introduced into Canada and growing wild in s. Ont. 1a, *M. a.* var. *pendula* Dipp.
2. *M. rubra* L., red mulberry; in Canada in s. Ont from the Niagara Peninsula to the Detroit R. The wood is used for posts, cooperage and boatbuilding because of its durability. The tree is sometimes planted for ornament and for its berries.

Fusarium lateritium Nees var. *mori* Desm.: dieback, dépérissement fusarien: on *M.* sp. BC 42:93, Ont F62:70; from sporodochia on blighted twigs of 1 BC [335].

Nectria sp.: canker, chancre: on 1a Ont 57:118.

Pseudomonas mori (Boyer & Lamb.) F.L.Stev.: bacterial spot and twig canker, chancre bactérien: on 1 Ont 46:77; ? on *M.* sp. PEI 41:83, [1138].

Muhlenbergia Schreb.

GRAMINEAE

Perennial, rarely annual, grasses of N. and S. America and e. Asia.

1. *M. asperifolia* (Nees & Mey.) Parodi, scratch grass; in Canada from Sask to BC.
2. *M. cuspidata* (Torr.) Rydb.; in Canada from Man to Alta.
3. *M. glomerata* (Willd.) Trin.; in Canada from NS to Ont.
4. *M. mexicana* (L.) Trin.; in Canada from NB and Que to s. BC.
5. *M. racemosa* (Michx.) BSP., wild timothy; in Canada from Man to Alta; adventive along railway lines in the east.

Phyllachora graminis (Pers. ex Fr.) Fckl.: on 2 Sask Man [93, p. 47]; almost certainly this is *P. vulgata* (q.v.).

P. vulgata Theiss. & Syd.: tar spot, rayure goudronneuse: on 1 BC, 4, 5 Ont [808], [cf. 1034].

Puccinia schedonnardi Kell. & Swingle: II III on 2 Man 43:39, [cf. 15, p. 143].

Tilletia asperifolii Ell. & Ev.: on 1 BC [292].

Uromyces minimus Davis: II III on 3 Ont [828; cf. 15, p. 137].

Myrica L.

MYRICACEAE

Shrubs or trees mainly of tropical and temperate regions.

1. *M. gale* L., sweet gale, bois-sent-bon; Nfld and NS to Alaska.
2. *M. pensylvanica* Loisel. (*M. caroliniensis* auct. non Mill.), bayberry, arbre à cire; in Canada in NB, the Magdalen Is., NS and Nfld.

Apioportha phomaspora (Cke. & Ell.) Wehm.: on 2 NS [1138].

Cronartium comptoniae Arth.: II III on 1 Alaska [175], Alaska BC Ont NS [15, p. 25], BC F52:152, [535, 1198], Ont [93, p. 63], Que 32:104, NS [1138].

Diaporthe eres Nit. (*D. valida* Nit.): on 2 NS [1138].

Ramularia destructiva Phill. & Plowr. (*Ovularia d.* (Phill. & Plowr.) Masee): on 1 Ont [93, p. 122], NS [1138].

Synchytrium vaccinii Thomas: on 1 NS [1138].

Tubercularia vulgaris Tode: on 1 Que 33:116.

Uncinula salicis (DC. ex Méral) Wint.: on 1 BC [50, 1198].

Myosotis L.

BORAGINACEAE

Low, mostly soft-hairy annual or perennial herbs of temperate regions; the cult. forms mostly from Europe.

1. *M. scorpioides* L., true forget-me-not; Europe and Asia, naturalized in Canada from Nfld and NS to Ont.
2. *M. sylvatica* Hoffm., garden forget-me-not, oreille de souris; Europe and n. Asia, commonly cult., spreading and locally naturalized in Canada in Gaspé Pen., Que to Ont.

Alternaria sp.: on leaves of *M.* sp. cult. PEI 50:128.

Botrytis cinerea Pers.: gray mold, moisissure grise: on stems and petals of *M.* sp. in greenhouse Ont 51:166.

Oidium sp.: powdery mildew, blanc: on *M.* sp. Que 59:89; possibly this is *Erysiphe polyphaga* Hammarlund, cf. 48:105.

Narcissus L.

AMARYLLIDACEAE

Handsome, hardy, bulbous plants of central Europe, n. Africa, to China and Japan; cult. for their spring bloom and for forcing. The cultivars are nearly all hybrids, mainly of *N. jonquilla* L., jonquil, jonquille; *N. poeticus* L., poets' narcissus, Jeanette; *N. pseudo-narcissus* L., trumpet narcissus or daffodil, narcissse; and *N. tazetta* L., polyanthus narcissus, tazette. No attempt has been made to indicate the individual hosts.

Armillaria mellea (Vahl ex Fr.) Kummer: dry rot, pourridié-agaric: on *N.* spp. BC 47:112, [535].

Botryotinia narcissicola (Greg.) Buchw. (*Sclerotinia n.* Greg.; stat. conid. *Botrytis n.* Kleb.): neck rot or smolder, feu du collet: on *N.* spp. BC 29:70, [535], Ont 33:71, NS 43:112, ? PEI 25:72, [1138]. The disease was most severe in early cultivars BC 36:79, but its prevalence declined when treatment of the bulbs was introduced, 42:103, and when plants with primary lesions were removed, 50:128. Smolder was more prevalent than usual in 1936, when the crop suffered freezing injury in the early winter, 36:129. Occasionally losses are high in bulbs used in forcing Ont 57:127, 58:117. This species forms the largest sclerotia found on the outer scales of the bulb [267].

B. polyblastis (Greg.) Buchw. (*Sclerotinia p.* Greg.; stat. conid. *Botrytis p.* Dowson): fire, feu: on *N.* spp.

BC 47:112, 48:111, [535], ? as *Sclerotium* sp. BC 62:98.

Ditylenchus dipsaci (Kühn) Filip. (*Anguillulina d.* (Kühn) Gerv. & van Ben., *Tylenchus d.* (Kühn) Bast.): bulb and stem nematode, anneau brune nématique: on *N. spp.* BC 30:90 et seq., [535], Ont 29:70, Ont Que 46:86. When narcissus was first grown commercially in BC, half the crop might be lost, 33:71; when the hot water treatment came into general use and bulbs for sale were grown under certification, its importance gradually declined, 45:117, 54:134. *Diplogaster longicaudatus* Bütschli was also present BC 31:98.

As the pre-adults were found to be more resistant to heat than other stages of the nematode, it was recommended that the bulbs be treated by the hot water method not later than 4 weeks after lifting, which should be done as soon as the foliage dies down. A presoak treatment was also suggested [425]; for additional details on detection and control of the nematode, see [391, p. 39]. Only a single strain of the nematode apparently occurs in narcissus and bulbous iris [426], but *D. destructor* has been observed on *Iris* (q.v.).

Fusarium oxysporum Schlecht. f. *narcissi* Snyder & Hansen (*F. bulbigenum* Cke. & Massee p.p.): basal rot, pourridié fusarien: on *N. sp.* BC 41:95, [535], in imported bulbs, 58:117; the fungus was isolated from decayed bulbs from BC and from imported bulbs [335].

Pratylenchus penetrans (Cobb) Filip. & Stekh.: root-lesion nematode, nématose des racines: on *N. spp.* BC 53:119; where yield and grade of bulbs decline because of root injury and early maturity of the crop. There was a good response to the soil fumigant MC2, 53:120.

P. pratensis (de Man) Filip. (*Tylenchus p.* de Man, *Anguillulina p.* (de Man) Goffart): meadow nematode; nématode des prés: on *N. spp.* BC 32:92, [427, 535], 34:88, 36:80, 56:129. It is uncertain whether both *P. pratensis* and *P. penetrans* (q.v.) are involved in decline of narcissus.

Ramularia vallisumbrosae Cav.: white mold, moisissure blanche: on *N. spp.* BC 32:92, [535]; occasionally severe, especially when the plants have become crowded; a pleomorphic fungus, cf. 43:54 sub. *R. pastinacae*.

Sclerotinia sativa Drayt. & Groves: sclerotinia rot, pourriture sclérotique: from *N. sp.* Que [266].

Stagonospora curtisii (Berk.) Sacc.: leaf scorch, grillure: on *N. spp.* BC 32:92 et seq., [535]; widespread but usually of minor importance.

Stromatinia narcissi Drayt. & Groves [267, p. 126]: large scale-speck: found repeatedly on the outer scales of narcissus bulbs imported from Holland. As inoculation experiments have failed to produce any disease, the fungus presumably is wholly saprophytic [267]. It probably occurs in BC as it is reported in the Pacific northwest of the US.

Narcissus mosaic virus: mosaic, mosaïque: on *N. spp.* BC 31:97 et seq., [535], in greenhouse Alta 41:95, Que 40:95, NS 47:113. In 1939, a virus condition referred to as gray streak was distinguished from mosaic, 39:105; later it was called decline, 49:29 and still later it was attributed to "white streak and associated viruses," 53:120. Whereas mosaic was evidently very prevalent when the growing of bulbs began commercially, 40:95, prompt roguing of diseased plants in the early spring quickly brought the disease under control, 42:103, and it now is at a very low level.

Narcissus white streak virus: decline, déclin viral: although Smith [1032] makes no mention of this

virus, certainly one or more viruses other than NMV cause heavy losses from reduction of yield and grade of bulbs in BC 53:120, [535]. The symptoms are conspicuous only late in the season except that the plants lack vigor and tend to mature early. No symptoms were observed in other than the trumpet varieties, 55:124. White streak virus was experimentally transmitted by Haasis [394]; no current-season symptoms developed, but rather inconspicuous ones, easily overlooked, were seen in the early season before the typical late-season symptoms developed.

Nardus L.

GRAMINEAE

Densely matted perennial grass of N. America and Eurasia.

1. *N. stricta* L., matgrass, poil du bouc; Greenl and Nfld; introduced locally in NS and Que.

Leptosphaeria nardi (Fr.) de Not: on 1 Greenl [899].

Lophodermium arundinaceum (Schrader ex Fr.) Chev.: on 1 Greenl [899].

Mycosphaerella pusilla (Auersw.) Johans. (*Sphaerella p.* Auersw.): on 1 Greenl [899].

Trochila exigua Rostr.: on 1 Greenl [899, p. 540].

Nemesia Vent.

SCROPHULARIACEAE

Tender herbs or subshrubs of central and s. Africa; attractive for the flower garden.

1. *N. strumosa* Benth.; an annual of s. Africa.

Fusarium sp.: isolated from plants of 1 affected by foot rot Que 44:113.

Phytophthora sp.: root rot, pourriture des racines: on *N. sp.* Alta 45:117; *P. sp.* was isolated.

Sclerotinia sclerotiorum (Lib.) de Bary: sclerotinia rot, pourriture sclérotique: on *N. sp.* Alta 40:95.

Aster yellows virus (callistephus virus 1): aster yellows, jaunisse de l'aster: on *N. sp.* Man 39:105, NB 37:80, PEI 46:87.

Nemopanthus Raf.

AQUIFOLIACEAE

Deciduous shrub of N. America.

1. *N. mucronata* (L.) Trel. (*N. canadensis* DC.), false holly, faux houx; in Canada from Nfld and NS to Ont.

Dermea peckiana (Rehm) Groves (stat. conid. *Micropera stellata*, q.v.): on 1 Ont [362, p. 69], NS [1138].

Durandiella nemopanthis (Pk.) Groves (*Godronia n.* (Pk.) Sacc.): on 1 Ont [362, p. 75; 977, 979], Ont Que [373].

Godroniopsis nemopanthis Groves (stat. conid. *Sphaeroneuma peckii*, q.v.): on 1 Ont [362, p. 71].

Micropera stellata (Ell.) Jacz.: on 1 NS [1138].

Microsphaera penicillata (Wallr. ex Fr.) Lév. (*M. alni* (DC.) Salm.): on 1 Que 32:104.

Rhytisma prini (Schw.) Fr. (*R. ilicis-canadensis* Schw.): on 1 Que 32:104, NB NS [1138].

Sphaeroneuma peckii Sacc. & Syd.: on stems of 1 NS [1138].

Venturia curviseta Pk.: on leaves of 1 NS [1138].

Nepeta L.

LABIATAE

Perennial or annual herbs mostly of the Old World.

1. *N. hederacea* (L.) Trev. (*Glechoma h.* L.), ground ivy, lierre terrestre; Eurasia, naturalized, Nfld to Ont.
2. *N. ucranica* L. (*N. ?grandiflora* Bieb.); e. Europe and w. Asia.

Botrytis cinerea Pers.: on *N.* sp. Alaska [175].

Phyllosticta decidua Ell. & Kell.: leaf spot, tache foliare: on 2 Man 44:113.

Septoria nepetae Ell. & Ev.: leaf spot, tache septorienne: on 2 Man 44:113.

Nephrolepis Schott

POLYPODIACEAE

Terrestrial or epiphytic ferns of tropical or subtropical regions; these are the sword-ferns, popular in house and conservatory.

Botrytis cinerea Fr.: on *N.* sp. Alaska [175].

Neslia Desv.

CRUCIFERAE

Erect herbs of the Old World.

1. *N. paniculata* (L.) Desv., ball mustard; naturalized from Europe in Nfld to BC, Mack and Yukon. A common weed in Western Canada.

Albugo cruciferarum S.F.Gray (*A. candida* (Pers. ex Lév.) O.Kuntze): on 1 Man [93, p. 29].

Cercospora nesliae Dearn. & Bisby: on 1 Alta Man ?Sask [93, p. 115], Alta 33:116.

Nicotiana L.

SOLANACEAE

Herbaceous or rarely shrubby plants mostly native to N., Central and S. America.

1. *N. glutinosa* L.; native to S. America; used in breeding tobacco cultivars resistant to mosaic and as an indicator plant in virus studies.
2. *N. tabacum* L., tobacco, tabac; cult. since prehistoric times by the American Indian and now throughout the world.

Alternaria longipes (Ell. & Ev.) Mason: brown spot, tache brune: on 2 Ont 56:87, NB 62:43. Although only noted in Ont in 1956, it apparently is becoming a serious disease particularly of flue-cured tobacco, 58:45. There is some doubt about the parasitic species of *Alternaria* present, 61:374. From seed of 2 Ont [374].

A. tenuis auct. sensu Wiltshire: from seed of 2 Ont [374].

Ascochyta ?nicotianae Pass.: leaf spot, tache ascochy-tique: on *N.* sp. cult. Man 44:113.

Aureobasidium pullulans (de Bary) Arn.: from seed of 2 Ont [374].

Cercospora nicotianae Ell. & Ev.: frog eye, tache ocellée: on 2 Ont 56:87, 58:45, Que 25:57, NB 28:82, [1138].

Cladosporium cladosporioides (Fres.) De Vries: from seed of 2 Ont [374].

Erwinia aroideae (Townsend) Holland: black leg, hollow stalk, or stalk soft rot, jambe noire ou tige creuse: black leg occurs on seedlings of 2 in the seedbed Ont 36:40, 38:60, and is present in small amounts almost every year. Hollow stalk occurs on the occasional plant in the field Ont Que 25:57, 35:41, Ont 40:54. As a result of topping damage or use of suckering oils, stalk soft rot or hollow stalk occurs occasionally, 57:48. Not only *E. aroideae* but also *E. carotovora* (L.R.Jones) Holland and *E. atroseptica* (van Hall) Jennison were recorded as pathogens.

Fusarium oxysporum Schlecht. f. *nicotianae* (J. Johnson) Snyder & Hansen: wilt, flétrissure fusarienne: on 2 Ont Que 24:44; widespread but damage slight, Ont 52:74.

F. poae (Pk.) Wt.: from seed of 2 Ont [334, 374].

Meloidogyne spp.: root-knot nematode, nodosité des racines: on 2 in seedbed Ont 40:54, and field 37:44, 39:63. The northern root-knot nematode, *M. hapla* Chitwood, was found on tobacco in the field and the southern root-knot nematode, *M. incognita* (Kofoid & White) Chitwood, on tobacco seedlings in the greenhouse, 61:376, 62:43.

Papularia arundinis (Cda.) Fr.: from seed of 2 Ont [374].

Peronospora tabacina Adam: blue mold or downy mildew, mildiou ou moisissure bleue: first observed on seedlings of 2 in Ont in 1938, 38:60. It occurred sporadically until 1945, 45:79 and for the years 1945-47, blue mold was epidemic, 46:58, 47:74. In the latter year most growers began to spray or dust their seedbeds with ferbam to control the disease and in consequence losses rapidly declined, 48:66. It was reported in the field in 1943, 43:74, where infected transplants were used. From a detailed study of its epidemiology it appeared that much of the field infection arose from spore showers from tobacco-growing areas in Kentucky and Ohio [1065], 56:87. Although the disease has never appeared in Que and now occurs sporadically in Ont 54:96, growers are advised to continue the program for blue mold control, 54:95, because it has also been found to aid in the control of damping-off, 55:88.

Pratylenchus spp.: brown root rot, pourridié brun nématique: although brown root rot on 2 was first recorded in Ont in 1930, 30:51, nematodes (*P. pratensis* (de Man) Filip.) were first suspected as the primary cause in 1950, 50:85, [567]. Finally Mountain [747] presented evidence that the disease was caused primarily by the root-lesion nematodes, *Pratylenchus* spp., principally *P. minyus* Sher & Allen, a *P.* sp. found in red clover, and to some extent by *P. penetrans* (Cobb) Filip. & Stekh. In fields of flue-cured tobacco in Norfolk Co., where rye was used regularly as a cover crop, it appeared that *P. penetrans* was the abundant species rather than *P. minyus*, 58 xxii, 61:55. Lower soil temperatures may also favor *P. penetrans*, 59:xvi. Nematicides are now being used to control the nematodes, 61:176. The disease has been reported from Que 31:53, but not in recent years.

Before the cause of brown root rot was known it appeared that the disease was worse where the land had been in timothy, 35:41, or where corn pre-

ceded tobacco in the rotation, 38:58. Accordingly, a search was made for toxic substances in plant residues. Substances capable of markedly inhibiting respiration, germination and growth of tobacco seedlings were obtained after residues of timothy, corn, rye or tobacco plants had been allowed to decompose under appropriate conditions. Timothy produced substances of the highest toxic activity. The substances are nonspecific, but they may perform an important role in predisposing plants to attack by organisms not normally pathogenic [834].

Pseudomonas angulata (Fromme & Murray) Holland: angular leaf spot, tache angulaire: on 2 Ont Que 24:44; although recorded nearly every year, it causes damage only occasionally, 49:71.

P. mellea J. Johnson: Wisconsin leaf spot, tache bactérienne: on 2 Que 42:67; the only report.

P. tabaci (Wolf & Foster) Stev. (*Bacterium tabacum* Wolf & Foster): wildfire, feu sauvage: on 2 Ont 32:54, Que 25:57; outbreaks recorded in the Yamaska Valley in Que, 29:38, 30:51, at Ottawa, 33:37, and in Essex Co., Ont., 54:95, but rarely destructive. *P. angulata* and *P. tabaci* may be one species, different strains causing the differences in symptoms, 54:95, [cf. 567].

Pyronema omphalodes (Bull. ex St. Amans) Fckl. (*P. confluens* (Pers.) Tul.: pink mold, moisissure des couches: in seedbeds of 2 Ont 30:11, Que 32:53, [cf. 567].

Pythium spp.: soft rot, pourriture pythienne: on newly set plants of 2 Ont 54:96 et seq.

Pythium spp., including *P. debaryanum* Hesse, and *Rhizoctonia solani* Kühn: damping-off, fonte des semis: on seedlings of 2 Ont 30:50, 34:74, Que 24:44; a serious disease in some seasons, 40:54, 43:73. Spraying the young seedlings with ferbam as recommended for blue mold proved valuable against damping-off, 46:57. Although the disease occurs every year, heavy damage is confined to beds where this program has not been followed, 52:73.

Rhizoctonia solani Kühn: sore shin, tige noire: on 2 Ont 33:39, Que 41:55; it causes appreciable damage in some years [cf. 567].

Rhizopus oryzae Went & Prinson Geerlings: leaf rot, moisissure chevelue: on leaves of 2 being cured Ont 42:67.

Thielaviopsis basicola (Berk. & Br.) Ferr.: black root rot, pourridié noir: on 2 in field Ont Que 24:44, and in the seedbed Ont 25:57, Que 24:44; repeatedly observed and occasionally severe on tobacco seedlings where steaming of the seedbed soil is not generally practiced [567]. Loss in the field is due to setting affected transplants.

The fungus is most destructive to cigar-leaf and pipe tobaccos in Que and burley types in s.w. Ont. *Rhizoctonia solani* and other fungi are often associated with the organism [564, cf. 447]. Two wild types of *T. basicola* were recognized. The grey type was less pathogenic and less able to survive long dormant periods than the brown [1060]. Two races of the brown type were found: race I in Ont and Que, and race II in Ont. Race I was highly pathogenic. Root invasion by *Thielavia basicola* Zopf was common in association with *Thielaviopsis*, which suggested a commensal relationship [1061]. The nutrition, etc., of the fungus has also been studied [1063, 1064].

Cucumber mosaic virus (cucumis virus 1): cucumber mosaic, mosaïque du concombre: Although in 1940, CMV occurred in the old and new tobacco belts of Ont, it did not appear to be widespread or to cause much damage. In Que, however, where tobacco is grown in comparatively small plots often adjacent

to vegetable crops CMV was more prevalent. Unlike TMV, CMV is spread by insects from overwintering hosts, 42:67, [851]. On 2 Ont 45:80, now prevalent in some years, 48:67, 50:86, [cf. 567].

Potato virus X (solanum virus 1): from 2 NB 41:56.

Potato virus Y (solanum virus 2): veinbanding, étrangement des nervures: isolated from 2 Ont 50:86, 54:97, 56:87.

Tobacco etch virus (nicotiana virus 7): etch, rainure: on 2 Ont 50:86, 51:77; TEV is widespread and injurious to 2 in Ont. Three strains were isolated; they differed in symptoms and behavior. Symptoms were severe on burley tobacco and mild on flue-cured cultivars. Its widespread occurrence is attributed to the current prevalence on tobacco of the vector, *Myzus persicae* (Sulz.). Infection with a strain of potato virus X that caused ring spot symptoms on tobacco and TEV resulted in a more serious disease in burley than infection with either virus alone [1062].

Tobacco mosaic virus (nicotiana virus 1): mosaic, mosaïque: on 2 BC 25:57, Ont Que 24:44, Ont 45:80, 50:86, Que NB 47:76, NS 54:98; sometimes prevalent in s. Ont 24:44. Incidence of TMV is much higher in fields where tobacco follows tobacco than when it follows other crops. It is easily transmitted mechanically [cf. 567]. *N. glutinosa*, 1, is being used to impart resistance to 2, 55:90. An inhibitor, which was found in *Dianthus barbatus*, a new host of TRV, reduced infectivity to TMV, CMV and TEV [1142]. Darkness affected lesion production in 1 [1143].

Tobacco ringspot virus (nicotiana virus 12): ring spot, tache annulaire: on 2 Ont 24:45; although ring spot may occur in nearly every field, the disease is of minor importance, 54:97, [567].

Tobacco streak virus (nicotiana virus 8): streak, bigarrure: on 2 Ont Que 39:61, 50:86. Streak is most prevalent at the borders of the field and in the vicinity of *Melilotus*. Infection is usually low in Ont and Que. Streak does not overwinter in the soil in Ont and little, if any, mechanical spread occurs. Circumstantial evidence suggests that under field conditions streak may spread from sweet clover to tobacco. Reciprocal transmissions of the virus were made on these two hosts [78]. Ambalema, a wild, chlorophyll-deficient variety of 2, was resistant to both TSV and TMV, 55:90.

Mushrooms, slime molds and green algae occur in seedbeds when the manure is not well decomposed, drainage is poor, etc. [567]. Records are: (a) mushrooms, Ont 41:54 et seq.; (b) slime molds, Ont 55:88, Que 31:15; (c) green algae, Ont 54:95.

Adverse effects of weather: (a) chilling at night causes chlorosis of young seedlings Ont 41:54, 42:66, [567]; (b) hail injury may be serious, Ont 31:54 et seq., Que 35:41, [567]; (c) lightning damage occurs occasionally, Ont 31:54, [567]; (d) early frosts cause damage in some years, Ont 31:38, Que 41:56.

Chemical injury from: (a) 2,4-D, Ont 47:75 et seq., [567]; (b) wood preservatives, creosote, Ont 54:96, and pentachlorophenol, NS 62:44; (c) chlordane, Ont 58:45.

Excess nutrients, excès d'éléments nutritifs: yellow patch, plaque jaune: on 2 Ont Que 38:59, 61; one of the more important seedling disorders of tobacco [567].

Magnesium deficiency, carence de magnésie: sand drown, jaunissure: on 2 Ont 37:45, 39:63, Que 30:51; rarely observed in Canada [567].

Nitrogen deficiency, carence d'azote: yellowing, pâleur: on 2 Ont 31:54; occurs every year to some extent [567].

Nicotiana

Potassium deficiency, carence de potasse: chlorosis, pyrolase: on 2 Ont 33:38, [567]. Lack of phosphorus, carence de phosphor, also occurs; the plants are abnormally green, growth is delayed, etc. [567].

Frenching, polyphyllie: on 2 in field, BC 26:28, 30:51, Ont 24:44, Que 27:83, and in the seedbed, Ont 44:74, [567]; associated with poorly drained areas Ont 39:63, or where soil type is unfavorable to tobacco, 52:74; the suggestion has been made that soil toxins may be responsible [cf. 834].

Air pollution, air impure: weather fleck, tache des feuilles: a serious problem in flue-cured tobacco since 1954 [1118]. However, nonparasitic leaf spots have been reported from BC Ont 26:28, Que 27:83, and physiologic leaf spots in Ont 31:54. Certainly what is now regarded as weather fleck was reported in the new tobacco belt in Ont in 1938, 38:63, and in lesser amounts in the old belt and Que 38:59, [567].

Susceptibility to weather fleck increased as the leaves matured. Its occurrence and intensity were directly related to the amounts of water applied under sprinkler irrigation, which hastened leaf maturity and rate of plant growth [1118]. Of the materials tested as potential antioxidants to control weather fleck, dichlorone when applied to both surfaces of the leaf proved the most effective in preventing the disorder in the field and ozone damage in a fumigation chamber [1117]. For a more complete discussion see [629].

Nierembergia Ruiz & Pav.

SOLANACEAE

Subshrubs and low perennial herbs of tropical America; ordinarily grown as annuals in the open border or as potted plants.

1. *N. frutescens* Dur.; native to Chile; grown as a potted plant blooming almost continuously.

Botrytis cinerea Pers.: gray mold, moisissure grise: on blossoms of seed plants of *N.* sp. BC [535].

Nigella L.

RANUNCULACEAE

Erect annual herbs of the Mediterranean region and w. Asia; a few cult. mostly in the flower garden.

1. *N. damascena* L., love-in-the-mist, pattes d'araignée.

Fusarium spp.: foot rot, pourridié fusarien: on *N.* sp. Man 38:105, 39:106; on 1 Man 43:112; *F. oxysporum* Schlecht. and *F. solani* (Mart.) App. & Wr. isolated from diseased basal parts of 1 Man [335].

Aster yellows virus (callistephus virus 1): aster yellows, jaunisse de l'aster: on *N.* sp. NB 49:108, NS 60:99; on 1 Man 44:113.

Nuphar Sm.

NYMPHAEACEAE

Aquatic herbs of the northern hemisphere.

1. *N. advena* (Ait.) Ait. (*Nymphaea a.* Ait.); as this species apparently does not occur in

Canada, the host is probably *N. variegatum* Engelm., cow lily, pied de cheval, which occurs from Labr, Nfld and NS to Mack and Alaska.

Entyloma nymphaeae (Cunn.) Setch.: on 1 BC Man Que [292], Ont [93, p. 61].

Phyllosticta fatiscens Pk.: on 1 Man [93, p. 135].

Sporobolomyces roseus Kluyver & van Niel.: from leaf of 1 Ont [93, p. 60].

Nymphaea L.

NYMPHAEACEAE

Aquatic plants of tropical and temperate regions.

1. *N. tuberosa* Paine, white water lily, nénuphar blanc; in Canada in s.w. Que to Ont.

Entyloma nymphaeae (Cunn.) Setch.: on 1 Ont NS [292], NS [1138].

Gloeosporium nymphaearum Allesch. [*Ramularia nymphaeae* Bres.]: on *N.* sp. BC [535].

Nymphoides Hill

GENTIANACEAE

Perennial aquatic herbs of N. America, Eurasia and Africa.

1. *N. cordata* (Ell.) Fern., floating heart, petit nénuphar; in Canada in Nfld and from NS to Ont.

Burrillia decipiens (Wint.) Clint.: on 1 Ont [292].

B. limnanthemis Cif.: on 1 Que [292].

Oenanthe L.

UMBELLIFERAE

Mostly aquatic glabrous herbs mainly of the Old World.

1. *O. sarmentosa* Presl; Alaska and BC to Oregon and Calif.

Nyssopsora echinata (Lév.) Arth.: III on 1 Alaska [175; cf. 15, p. 99].

Septoria oenanthis Ell. & Ev.: on 1 BC [535].

Oenothera L.

ONAGRACEAE

Annual, biennial or perennial herbs widely distributed in the temperate regions of the New World.

1. *O. biennis* L. (*O. victorinii* Gates & Catchside), common evening primrose, mâche rouge; in Canada in all provinces but more common in the east than the west. 1a, *O. b.* var. *hirsutissima* Gray (*O. strigosa* (Rydb.) Mack. & Bush); in Canada from PEI, NB and Que to BC.

2. *O. nuttallii* Sweet, white evening primrose, onagre blanche; in Canada from Man to BC.
3. *O. parviflora* L. (*O. muricata* L.); in Canada from Nfld and NS to Que and Ont.
4. *O. perennis* L. (*O. pumila* L.), sundrops; in Canada from Nfld and NS to Man.
5. *O. serrulata* Nutt.; in Canada from Man to Alta.

Botrytis cinerea Pers.: on *O.* sp. Alaska [175].

Erysiphe cichoracearum DC. ex Mérat: on *O.* sp. BC [50], BC PEI 25:80; seems doubtful.

E. polygoni DC. ex Mérat: powdery mildew, blanc: on *O.* sp. cult. Man 38:105; on 1 Sask Man [93, p. 44], Que 32:104, NB 30:97, NB NS [1138]; on 1 Ont, 3 Que, cleistothecia seen only in the latter collection [964].

Leptosphaeria ellisiana Berk. (as *L. ellisianus*): on *O.* sp. NS [1138].

Mycosphaerella tassiana (de Not.) Johans.: on 1 BC [50].

Peronospora arthuri Farl.: downy mildew, mildiou: on *O.* spp. Sask Ont Que NS, 1 NS 43:112; on *O.* sp. PEI, 1 NS [1138]; on 1 Sask Man, 1a Sask [93, p. 30].

Pleospora herbarum (Fr.) Rabh. (*P. armeriae* (Cda.) Ces. & de Not.): on *O.* sp., 1 BC [50].

Puccinia dioicae P.Magn. (*P. extensicola* Plowr., *P. ludibunda* Ell. & Ev., *P. peckii* Kell.): rust, rouille: 0 I on *O.* sp. cult. NB 60:70; on 1 Sask Man, 5 Man [93, p. 68]; on 1 Man 24:80, Ont [828], Que 42:103, [cf. 15, p. 199].

P. oenotherae Vize: 0 I II III on *O.* sp. NS [1138]; examination of the specimens in the laboratory at Kentville so labelled were in reality indistinguishable from *U. plumbarius* (q.v.) fide Parmelee.

Septoria oenotherae West.: leaf spot, tache septorienne: on *O.* sp. BC [535], BC Man 38:105; on 1 Alta 34:105, Sask Man [93, p. 139], Que 42:103; on 1 BC Alta Sask Man Ont Que, 2 Sask, 3 Que, 4 Ont Que NS [964]; on 4 Que 32:104.

Uromyces plumbarius Pk.: 0 I II III on *O.* sp., 1, 3 NS [1138]; on 1 NS 30:97, [cf. 15, p. 249].

Oncidium Sw.

ORCHIDACEAE

Epiphytic plants of the western hemisphere.

Uredo behnickiana P. Henn.: II on potted plants of *O. longipes* in greenhouse Ont [828]; known also from NJ [15, p. 391].

Onobrychis Gaertn.

LEGUMINOSAE

Perennial, herbaceous or somewhat shrubby plants of Europe, n. Africa and w. Asia; one species grown for forage and another for ornament.

1. *O. viciifolia* Scop., sainfoin, esparcette; central and s. Europe and Asia; cult. to some extent in w. N. America.

Ascochyta orobi Sacc.: leaf and stem spot, tache ascochytiq: on 1 BC [535].

Low-temperature basidiomycete, basidiomycète frigophile: three strains of 1 suffered severe damage when planted in infested land, Alta [217].

Sclerotinia trifoliorum Erikss: sclerotinia wilt, flétrissure sclérotique: on 1 BC [535], Ont 49:23

Onoclea L.

POLYPODIACEAE

A fern of N. America and e. Asia.

1. *O. sensibilis* L., sensitive fern; in Canada from Nfld and Labr to Man.

Ceratobasidium anceps (Bres. & Syd.) Jackson: on 1 Ont [495].

Taphrina hiratsukae Nishida: on 1 Ont [734, 735].

Uredinopsis americana Syd. (*U. mirabilis* (Pk.) Magn.): II¹ II² III on 1 Ont 24:48, [816], Que 32:104, NS [1138], Ont-Nfld [289], Ont Que NS [15, p. 3]; cultured on the respective hosts by Fraser, see [15].

Onopordon L.

COMPOSITAE

Coarse, branching annuals or biennials native to the Old World.

1. *O. acanthium* L., Scotch thistle, épine blanche; in Canada from NB to Ont; naturalized from Europe.

Puccinia onopordi Syd.: II III on 1 NS [15, p. 346; 1138]; apparently this introduced rust died out later.

Onosmodium Michx.

BORAGINACEAE

Chiefly perennial herbs of N. America.

1. *O. occidentale* Mack.; in Canada from Man to Sask.

Puccinia recondita Rob. ex Desm. (*P. rubigo-vera* Wint.): 0 I on 1 Man [93, p. 71; cf. 15, p. 182].

Ornithogalum L.

LILIACEAE

Bulbous scapose plants of the Old World, some planted in the open or in pots for their bloom.

1. *O. umbellatum* L., star-of-Bethlehem or nap-at-noon, belle de jour; Mediterranean region, naturalized in Canada from Nfld and NS to Ont.

2. *O. thyrsoides* Jacq.; native to S. Africa.

Other host: 3, *O. lacteum* Jacq.

Puccinia ornithogali-thyrsoidis Diet.: II III on ?3 greenhouse Man [93, p. 70].

Tomato spotted wilt virus (lycopersicum virus 3): spotted wilt, tache de bronze: on 3 Que 43:112.

Oplopanax (Torr. & Gray) Miq.

ARALIACEAE

Coarse shrub thickly beset with straw-colored prickles; w. N. America and n.e. Asia.

1. *O. horridus* (Sm.) Miq., devil's club, bois piquant; from Alaska to Oregon, Mont and Calif.

Botrytis cinerea Fr.: on *O.* sp. Alaska [175].

Cercospora daemionicola Sprague: on 1 Alaska [341, 983].

Orchis L.

ORCHIDACEAE

Acaulescent plants of the northern hemisphere, mainly Eurasia.

1. *O. aristata* Fisch.; Alaska and e. Asia.

Puccinia praegracilis Diet. (*Aecidium graebnerianum* P. Henn.): 0 I on *O.* sp., 1 Alaska [175]; on 1 Alaska [15, p. 383]; the grass host for the rust on *Orchis* has not been established.

Oryzopsis Michx.

GRAMINEAE

Tufted perennial grasses of N. America and Eurasia.

1. *O. asperifolia* Michx., winter grass; in Canada in Nfld and from NS to BC.
2. *O. hymenoides* (Roem. & Schult.) Ricker, silk grass; in Canada from Man to BC.
3. *O. pungens* (Torr.) Hitchc.; in Canada in NS and from Que to BC.

Claviceps purpurea (Fr.) Tul.: on 1 Que [197].

Mycosphaerella tassiana (de Not.) Johans.: on *O.* spp. BC [50].

M. wichuriana (Schroet.) Johans.: on 3 BC [50].

Phyllochora graminis (Pers. ex Fr.) Fckl.: on 1 Man [93, p. 47], Que 32:104; but see below.

P. oryzopsidis (Rehm) Theiss. & Syd.: on 1 Ont Que [805, 1034].

Platyspora pentamera (Karst.) Wehm. (*Clathrospora p.* (Karst.) Berl.): on 2 BC [50].

Puccinia pygmaea Erikss.: rust, rouille: II III on 1 Man [93, p. 70], Ont [15, p. 138; cf. 828].

Ustilago hypodytes (Schlecht.) Fr.: on 2 Sask [292].

Osmaronia Greene

ROSACEAE

Deciduous shrubs, one or more species in w. N. America.

1. *O. cerasiformis* (Torr. & Gray) Greene (*Nuttallia c.* Torr. & Gray), osoberry; BC to Calif.

Corticium laeve Pers. ex Fr.: on 1 BC [1198].

Cylindrosporium nuttalliae (Harkn.) Dearn.: cause of a leaf spot or blight on 1 BC 42:93, [535, 1198].

Diaporthe columbiensis Ell. & Ev.: on 1 BC, fide Dearness but uncertain [50].

Peniophora vermifera Bourd.: on 1 BC [1152].

Osmorrhiza Raf.

UMBELLIFERAE

Perennial herbs of N. and S. America and e. Asia.

1. *O. chilensis* Hook. & Arn. (*O. divaricata* Nutt. nom. nudum, *O. nuda* Torr.); in Nfld and from NS to Alaska south to Calif; also in S. America.
2. *O. claytoni* (Michx.) Clarke, sweet jarvil; in Canada in NS and from Que to Sask.
3. *O. longistylis* (Torr.) DC.; in Canada in NS and from Que to Alta.
4. *O. purpurea* (Coult. & Rose) Suksd.; Alaska to Wash and Calif.

Cercospora osmorrhizae Ell. & Ev.: on 3 Man [93, p. 115].

Colletotrichum dematium (Fr.) Grove: on old stems of 3 Man [93, p. 129].

Phleospora aegopodii (Desm.) Grove (*Septoria a.* Desm.): on 1 BC [535]; on 3 Man 34:105, [93, p. 134].

Puccinia pimpinellae (Str.) Röhling: 0 I II III on 1 Alaska [15, p. 315], BC [535, 1198]; on 1, 3 Alaska [175]; on 2 Ont 31:122, Que 33:116, Ont Que [15], NS [1138]; on 3 Sask 32:104, Sask Man [93, p. 70], Man 34:105, Sask Man Ont [15; cf. 828]; on 4 BC [1203].

Septoria osmorrhizae Pk.: on 1 Alaska [983].

Osmunda L.

OSMUNDACEAE

Ferns of tropical and temperate regions, but absent from w. N. America.

1. *O. cinnamomea* L., cinnamon fern, noix sauvage; in Canada in Nfld and from NS to Ont.
2. *O. claytoniana* L., interrupted fern; in Canada in Nfld and from NS to s.e. Man.
3. *O. regalis* L., royal fern, fougère fleurie; Eurasia, represented by 3a, *O. r.* var. *spectabilis* (Willd.) Gray, in Canada in Nfld and from NS to Sask.

Corticium praestans Jackson: on stems of 2 Ont [494, p. 148], see *Quercus*.

Dothidella osmundae (Pk. & Clint.) Sacc.: on 1 NS [1138].

Mycosphaerella minor (Karst.) Johans.: on 3a Que [53].

Uredinopsis osmundae Magn.: II III on 1 Ont 24:48, Que 32:104; on 1, 2, 3a Ont [816], NS [1138]; on 1 Ont Que NB, 2 Ont Que NB NS, 3a Ont NS [289]; on 2 Ont 24:48, NB F55:25; on 2, 3a NS [15, p. 3]; on 3 Que 32:104.

Ostrya Scop.

CORYLACEAE

Slender trees of the northern hemisphere.

1. *O. virginiana* (Mill.) K.Koch, ironwood, bois de fer; in Canada from NS to Man. The wood is one of the hardest and toughest of native woods and is used locally for vehicle stock, tool handles and spring poles.

Aleurodiscus oakesii (Berk. & Curt.) Höhn. & Litsch.: on 1 Ont Que [599].

Armillaria mellea (Vahl ex Fr.) Kummer: on 1 Ont F54:76.

Cylindrosporium dearnessii Ell. & Ev.: leaf spot, tache des feuilles: on 1 Man 43:97, Ont Que 46:77, Que 47:101, NB NS F55:26.

Fomes ignarius (L. ex Fr.) Kickx: on 1 Ont, common, F54:72; on 1 NB F54:24; from 1 Ont [791].

F. pinicola (Sw. ex Fr.) Cke.: on 1 Ont F51:135.

Melanconis ostryae (Dearn.) Wehm.: on 1 Ont F59:66.

Ophiocordyceps clavulata (Schw.) Petch: on the scale insect, *Lecanium corni* Bouché, on 1 NB [1138].

Phyllactinia guttata (Fr.) Lév. (*P. corylea* (Pers.) Karst.): powdery mildew, blanc: on 1 NS [1138].

Poria obliqua (Pers. ex Fr.) Karst.: from 1 Ont [791].

Septoria ostryae Pk.: leaf spot, tache des feuilles: on 1 Ont 25:64, NS 52:105, 53:107.

Stereum murrayi (Berk. & Curt.) Burt: from 1 Que [791].

Taphrina virginica Seym. & Sadeb.: leaf blister, cloque des feuilles: on 1 Ont 45:103, [735].

Oxalis L.

OXALIDACEAE

Herbs or suffrutescent subshrubs of semicosmopolitan distribution.

1. *O. corymbosa* DC.
2. *O. europea* Jord., yellow sorrel, pain d'oiseau; a weedy plant, in Canada in NS, NB and from Ont to Sask.
3. *O. montana* Raf., wood sorrel, surette; in Canada in Nfld, NS and from Que to Man.
4. *O. rubra* St. Hil.; native to Brazil.
5. *O. stricta* L. (*O. corniculata* L. var. *s.* (L.) Trel.), yellow sorrel, pain d'oiseau; in Canada from PEI to BC.

Botrytis cinerea Pers.: on *O.* sp. Alaska [175].

Microsphaera russellii G.W.Clint.: on 5 NS [1138].

Puccinia oxalidis Diet. & Holw.: II only seen on 1, 4 in greenhouse Ont 47:113, [828].

Ramularia oxalidis Farl.: on 3 Que NS [956].

Oxyria Hill

POLYGONACEAE

A low arctic-alpine plant of arctic and cool temperate regions.

1. *O. digyna* (L.) Hill, rhubarb; Greenl, Nfld and Que to Alaska; also in n. Eurasia.

Cercospora oxyriae Rostr.: on 1 Greenl [900, p. 629]; stat. conid. of *Mycosphaerella oxyriae* (q.v.) [971].

Chaetomium spirale Zopf: on remains of 1 BC [50].

Cladosporium herbarum Lk.: on 1 Greenl [902].

Coleroa oxyriae Rostr.: on 1 BC [50], Greenl [901, p. 617; 902].

Heteropatella umbilicata (Pers. ex Fr.) Jaap (*Septoria cercosperma* Rostr.): on 1 Greenl [899].

Leptosphaeria oxyriae Rostr.: on 1 Greenl [899, p. 559].

Mollisia atrata (Pers.) Karst.: on 1 Greenl [899].

Mycosphaerella densa (Rostr.) Lind: on 1 Frank [52].

M. oxyriae Savile (stat. conid. *Ramularia o.* Trail, *Cercospora o.* Rostr.): ascigerous and conidial states on 1 Frank Que and conidial state on 1 Yukon [971, p. 715].

M. polygonorum (Crié) Lind (*Sphaerella p.* (Crié) Sacc.): on 1 Frank [606], Greenl [899].

M. tassiana (de Not.) Johans. (*M. pachyasca* (Rostr.) Vestergr.): on 1 Mack [250], Frank [604], Greenl [601, 603].

M. tassiana var. *tassiana*: on 1 Que [52]; this specimen is *M. oxyriae* (q.v.) [971].

Ophiobolus brachystoma Sacc.: on 1 Greenl [902].

Pleospora androsaces Fckl. (*Pyrenophora a.* (Fckl.) Sacc.): on 1 Frank [604], Greenl [603].

P. cerastii Oud. (*Pyrenophora c.* (Oud.) Lind): on 1 Alaska [175, 604], Greenl [603].

P. comata Auersw. & Niessl (*Pyrenophora c.* (Niessl) Sacc.): on 1 Alaska [175, 604], Mack [250], Frank [603, 605], Greenl [601, 899].

P. helvetica Niessl: on 1 Que [52].

P. herbarum (Fr.) Rabh.: on 1 Frank [52, 903], Greenl [602, 603].

P. penicillus (Schm.) Fckl. var. *p.* (*Pyrenophora chrysospora* (Niessl) Sacc.): on 1 Frank [600], Greenl [603].

P. phaeocomoides (Berk. & Br.) Wint. var. *infectoria* (Fckl.) Wehm. (*P. i.* Fckl.): on 1 Greenl [603].

P. scrophulariae (Desm.) Höhn.: on 1 Frank [52].

Puccinia oxyriae Fckl.: II III on 1 Alaska [175], BC Alta [15, p. 281], Frank [600], Frank Keew [971].

Sclerotium oxyriae Rostr.: on 1 Greenl [899, p. 579].

Septoria pleosporioides Sacc.: on 1 Greenl [900].

Ustilago vinosa (Berk.) Tul.: on 1 Alaska [175], BC [957], BC Yukon Frank [953], Frank Keew [959], Frank [605, 961, 962, 971], Greenl [899, 901, 902; cf. 292].

Oxytropis DC.

LEGUMINOSAE

Perennial, mainly low acaulescent herbs, native to the northern hemisphere.

1. *O. arctica* R.Br. (including *O. roaldi* Ostenf.); Alaska and arctic and subarctic regions of Canada.
2. *O. bellii* (Britt.) Palib.; in arctic Canada and e. Asia.
3. *O. campestris* (L.) DC., including 3a, *O. c.* var. *cusickii* (Greenm.) Barneby (*O. cusickii* Greenm., *O. alpicola* (Rydb.) Jones); mts. Alta, BC, Wash and Oregon; 3b, *O. c.* var. *gracilis* (A.Nels.) Barneby (*O. g.* (A.Nels.) K.Schum.); Alta and Alaska; 3c, *O. c.* var. *sordida* Willd. (*O. s.* auct.); 3d, *O. c.* var.

Oxytropis

terrae-novae (Fern.) Barneby (*O. t.-r.* Fern.); Nfld, Que and Mack.

4. *O. maydelliana* Trautv. (*O. campestris* (L.) DC. var. *melanocephala* Hook.); arctic Canada, Alaska and e. Asia.
5. *O. nigrescens* (Pall.) Fisch., including 5a, *O. n.* var. *uniflora* (Hook.) Barneby (*O. arctobia* Bunge); arctic Canada.
6. *O. viscida* Nutt. var. *hudsonica* (Greene) Barneby (*O. h.* (Greene) Fern); arctic Canada. 6a, *O. v.* var. *subsucculenta* (Hook.) Barneby (*O. leucantha* (Pall.) Pers.); Alaska, Mack and n. Asia.

Erysiphe polygoni DC. ex Méral: on 3b Alaska [1038].
Mycosphaerella tassiana (de Not.) Johans: on 6 Keew [604].

M. tassiana var. *tassiana*: on 4 Frank [52].

Pleospora ambigua (Berl. & Bres.) Wehm.: on 4 Frank [52].

P. arctica Fekl. (non *P. arctica* Karst.): on 3c Frank [250].

P. cerastii Oud. (*Pyrenophora c.* (Oud.) Lind): on 3c Man, 5 Alaska [604].

P. comata Auersw. & Niessl (*Pyrenophora c.* (Niessl) Sacc.): on 3a BC [50]; on 4 Frank [52].

P. helvetica Niessl: on 4 Frank [52].

P. herbarum (Fr.) Rabh.: on 1 Alaska [175], Mack [250]; on 2 Mack [604].

P. oblongata Niessl: on 5 Yukon [600].

P. panictricha Fekl. (*Pyrenophora p.* (Fekl.) Berl. & Vogl.): on 1 Mack [250].

P. penicillus (Schm.) Fekl. var. *p.* (*Pyrenophora chrysospora* (Niessl) Sacc.): on *O. sp.*, 5 Alaska [175]; on 3c Mack, 5 Alaska [250]; on 4, 5a Frank [600].

P. scrophulariae (Desm.) Höhn.: on 6b Keew [604].

P. tragacanthae Rabh.: on *O. sp.*, 4 Frank [52]; on 3a BC [50].

P. vagans Niessl: on 6a Alaska [175].

Rhabdospora oxytropidis Syd.: on 4 Que [605].

Sphaerella astragali (Currey) Cke.: on 2 Man [93, p. 53].

Uromyces lapponicus Lagerh.: 0 I III on 3d, 4 Que [605]; I on 4 Frank [962]; on 5 Alaska [175; cf. 15, p. 302].

Pachistima Raf.

CELASTRACEAE

Deciduous shrubs of N. America.

1. *P. myrsinites* (Pursh) Raf.; from BC to Calif.

Mycosphaerella pachystimae Dearn.: on living leaves of 1 BC [50].

Pachysandra Michx.

BUXACEAE

Procumbent herbs or subshrubs of e. N. America and e. Asia; grown as a ground cover.

Volutella pachysandricola B.O.Dodge: leaf spot, tache foliaire: on *P. sp.* imported from NY into Ont 54:135.

Paeonia L.

RANUNCULACEAE

Perennial herbs or subshrubs of the northern hemisphere, mainly in Asia; cult. for their showy blooms.

1. *P. lactiflora* Pall. (*P. albiflora* Pall.), peony, pivoine; native to Siberia and China; occurs in many cultivars.
2. *P. officinalis* L.; native to s. Europe and w. Asia; little cult.
3. *P. tenuifolia* L., native to s.e. Europe and the Caucasus; rarely cult.

Botrytis cinerea Pers.: gray mold, moisissure grise: although *B. paeoniae* is the cause of a serious blight of new shoots from the crown of peony plants, *B. cinerea* may be responsible for most of the blighting of buds, blossoms and leaves; recorded on *P. spp.* BC 48:111, Sask 50:129, Ont NB 45:117, Que 47:113; on 2 cult. Man [93, p. 113].

B. paeoniae Oud.: botrytis blight, brûlure botrytique: on *P. spp.* BC-PEI 24:55, 25:73, 32:93, 34:88, NB-PEI [1138]; on 2 Sask Man [93, p. 113]; severe on 2, 3 Man 39:106. The disease is severe in some seasons, but mainly in beds where plant debris has not been carefully removed Que 32:93. Spraying with a copper fungicide was effective against current-season infection NB 36:80, 37:80.

Cercospora ?variicolor Wint.: leaf spot, tache foliaire: on *P. spp.* BC 37:81, [535].

Cladosporium paeoniae Pass.: leaf blotch, brûlure cladosporienne: on *P. spp.* cult. Alaska [175], BC 33:71, [535], Man 44:113, Ont 38:106, Que 31:98; on 2 Man [93, p. 116].

Fusarium spp.: reported causing a severe root rot of *P. spp.* Que 23:120; *F. poae* (Pk.) Wr. and *Botrytis paeoniae* were isolated from blighted stems of 1 and *F. solani* (Mart.) App. & Wr. from basal parts of wilted plants Man [335].

Meliodogyne spp. (*Heterodera marioni* (Cornu) Goodey): root-knot nematode, nodosité des racines: on *P. spp.* Ont 46:87, PEI 36:80, 37:81.

Phoma ?paeoniae Allesch.: on old stems of 1 Man [93, p. 134].

Phyllosticta baldensis Massal.: on *P. sp.* Alaska [175].

P. commonsii Ell. & Ev.: leaf spot, tache foliaire: on *P. spp.* Alta 38:106, Man [93, p. 135], Alta Man Que NS 52:117.

Phytophthora paeoniae Cooper & Porter: phytophthora blight, mildiou: on *P. sp.* Que 47:113; symptoms similar to botrytis blight. Weiss [3] reduces the species to synonymy under *P. cactorum* (Leb. & Cohn) Schroet.

Septoria paeoniae West.: septoria leaf spot, tache septorienne: on *P. spp.* BC 37:81, Alta 43:113, Man 34:89, [93, p. 139], Ont 29:70, Que 24:55, NS PEI [1138]. Although the older records are under *S. paeoniae* var. *berolinensis* Allesch., it is doubtful that the variety should be recognized [cf. 93].

Peony ring-spot virus: mosaic or ring spot, mosaïque ou tache annulaire: on *P. spp.* as mosaic: BC [535], Alta 45:118, Man NS 33:72, Ont 51:119, Que 43:113, PEI 38:106, 42:103; as ring spot: Alta 39:106, Sask Que NS 35:70, Man 32:93, Ont 52:117, NB 33:72, NS 56:130, PEI 48:111. These diseases more or less seriously affect the plant, but they rarely show signs of spreading. A condition of unknown cause, known as stunt, has been recorded in *P. spp.* in NB 53:120 et seq.

Iron deficiency, carence de fer: chlorosis, chlorose: on *P. spp.* Sask 51:116, Man 41:96.

Panax L.

ARALIACEAE

Herbaceous perennials of e. N. America and e. Asia.

1. *P. quinquefolius* L., ginseng, ginseng; in Canada from Que to Man; cult. for its root, which is exported to China where it is used by the Chinese in their medicine.
2. *P. trifolius* L., ground-nut, courson ou ginseng nain; in Canada from PEI and NS to Ont.

Alternaria panax Whetz.: leaf spot, brûlure alternarienne: on 1 BC [535].

Cylindrocarpon spp.: disappearing rot, évanouissement: on 1 Man 51:50, ?PEI 37:27.

Meloidogyne sp. (*Heterodera marioni* (Cornu) Goodey): root-knot nematode, nodisité des racines: on 1 BC 49:47.

Puccinia araliae Ell. & Ev.: III on 2 Que [828; cf. 15, p. 314].

Ramularia spp.: disappearing rot, évanouissement: on 1 BC 49:47, Ont [441]; a disease of economic importance in ginseng-growing districts. Hildebrand [441] distinguished three species, *R. panacicola* Zinssmeister, *R. mors-panacis* Hildebrand and *R. robusta* Hildebrand; the first two were the most aggressive on ginseng. A condition known as "rust," "rouille," was also of some importance. Rotation and rigid sanitation were the only control measures suggested. Weiss [3] notes that the descriptions of these fungi appear to fit those of *Cylindrocarpon*.

Rhizoctonia solani Kühn: stem rot, rhizoctonie: on 1 BC 31:40.

?*Verticillium* sp.: papery leaf spot, tache foliaire: on 1 Ont 44:34.

Panicum L.

GRAMINEAE

Annual or perennial grasses of temperate and tropical regions.

1. *P. capillare* L., witchgrass, mousseline; in Canada from NS to Man.
2. *P. lanuginosum* Ell. var. *fasciculatum* (Torr.) Fern. (*P. tennesseense* Ashe); in Canada from Nfld to s. Que and s. Ont.
3. *P. linearifolium* Scribn.; in Canada in Que and Ont.
4. *P. mileaceum* L., millet or broom-corn millet, millet blanc; cult. and adventive from Europe and w. Asia; occurs occasionally in Canada but does not persist.
5. *P. occidentale* Scribn.; BC to Idaho and Calif.
6. *P. subvillosum* Ashe; in Canada in NS and from Que and Sask.
7. *P. thermale* Boland.; Alta to Wash, Wyo and Calif.

8. *P. virgatum* L., witchgrass; in Canada from Que to Sask.

Fusarium equiseti (Cda.) Sacc. and *F. poae* (Pk.) Wr.: from seeds of 4 Ont [334].

Leptosphaeria culmifraga Ces. & de Not.: on 5 BC [50].

L. typharum (Desm.) Karst., sensu Bres.: on 7 BC [50].

Mycosphaerella tassiana (de Not.) Johans.: on 5 BC [50].

Phyllachora punctum (Schw.) Orton: on 2, 3 Ont [805, p. 33; 1034]; on 6 NS 52:41.

Pseudomonas syringae van Hall (*Phytomonas panici* Ch.Elliott, *Phytomonas holci* (Kendr.) Bergey et al.): bacterial leaf spot, tache bactérienne: on 4 Alta 28:33, Man 37:17, Ont 36:16.

Puccinia emaculata Schw.: II III on 1 Ont [15, p. 128; cf. 828].

P. panici Diet.: on 8 Ont [828; cf. 15, p. 128].

Pythium debaryanum Hesse: on 4 Sask [1034].

P. graminicola Subram. (*P. arrhenomanes* Drechsl.) and *P. spp.*: browning root rot, piétin brun: caused damage to 4 Sask 42:21, Sask Man [1034].

Sorosporium cenchri Henn.: on 1 Ont [292].

Tilletia maclagani (Berk.) Clint.: on 8 Ont [292].

Ustilago destruens (Schlecht.) Rabh. apud Klotzsch (*Sphacelotheca d.* (Schlecht.) Stevenson & A.G. Johns., *Sorosporium panici-milacei* (Pers.) Tach., *S. syntherismae* auct. non (Pk.) Farl.): smut, charbon: on 4 BC 32:30, [535], Alta Sask Man Ont Que NS [292], Alta Sask Man 24:19, Sask Man [93, p. 61], NB 34:25, PEI 36:17.

Papaver L.

PAPAVERACEAE

Annual, biennial or perennial herbs mostly in the Old World, but a few species native to w. N. America.

1. *P. nudicaule* L., Iceland poppy, pavot safrané; arctic regions of N. America and Eurasia.
2. *P. orientale* L., oriental poppy, pavot du Levant; about the Mediterranean to Iran.
3. *P. radicum* Rottb.; a circumpolar plant.
4. *P. rhoeas* L., corn poppy, coquelicot; native to Europe and Asia; cult. and escaped NS to Ont; includes the Shirley poppy.
5. *P. somniferum* L., common or opium poppy, pavot; native to Europe and Asia, cult. and escaped Nfld to Ont.

Alternaria sp. ?inedit.: leaf spot, tache foliaire: on 2 Ont 46:87.

Botrytis cinerea Pers.: on *P. sp.*, Alaska [175].

Cuscuta gronovii Willd.: dodder, cuscute: on 1 cult. Man 44:114.

Didymella exigua (Niessl) Sacc.: on 3 Frank [52].

Entyloma fuscum Schroet.: smut, charbon: on *P. sp.* NB [1138; cf. 292]; on 2, 4 Ont NB, 5 Ont [945], cf. 44:114, 45:118. In a study of the smuts on Papaveraceae, inoculum from 4 caused infection on 5 and other species of *Papaver*, but not on 1 nor species in other genera of the family; these results suggested that the smut is physiologically specialized.

Fusarium spp.: foot or root rot, pourridié fusarien: on 4 Man 38:106, 5 Ont 45:118. *F. equiseti* (Cda.)

Paperver

Sacc., *F. oxysporum* Schlecht., *F. solani* (Mart.) App. & Wr. were isolated from diseased 4 Man [335].

Heteropatella umbilicata (Pers. ex Fr.) Jaap (*Rhabdospora cersosperma* Rostr.): on 3 Frank [600], Greenl [604].

Leptosphaeria papaveris Rostr.: on 3 Greenl [603].

Mycosphaerella minor (Karst.) Johans.: on 3 Frank Que [52].

M. tassiana (de Not.) Johans. (*M. pachyasca* (Rostr.) Vesterg.): on 3 Mack [250], Mack Frank [604], Greenl [601, 602, 603]; on 3 f. *albiflora* Frank [600].

M. tassiana var. *arctica* (Rostr.) Barr: on 3 Frank Que [52].

M. tassiana var. *arthopyrenioides* (Auersw.) Barr (*Sphaerella a.* Auersw.): on 1 Frank [903], Greenl [899, 901, 902].

M. tassiana var. *tassiana*: on 3 Frank Que [52].

Physalospora polaris Rostr.: on 1 Greenl [899, p. 548].

Platyspora pentamera (Karst.) Wehm. (*Clathrospora p.* (Karst.) Berl.): on 3 Alaska [603], Frank [604].

P. permunda (Cke.) Wehm. (*Clathrospora p.* (Cke.) Berl.): on 3 Frank [52].

Pleospora sp.: on 1 Frank [250].

P. ambigua (Berl. & Bres.) Wehm.: on 3 Frank [52].

P. comata Auersw. & Niessl (*Pyrenophora c.* (Niessl) Sacc.): on 3 Frank [52]; Greenl [601, 603].

P. coronata Niessl (*Pyrenophora c.* (Niessl) Sacc.): on 3 Greenl [603].

P. helvetica Niessl: on 3 Frank Que [52].

P. herbarum (Fr.) Rabh.: on 1 Alaska [175, 250]; on 3 Frank [903], Frank Que [52], Greenl [603, 899].

P. papaveracea (de Not.) Sacc.: on 1 Greenl [601, 899].

P. paucitricha Fckl. (*Pyrenophora p.* (Fckl.) Berl. & Vogl.): on 1 Mack [250].

P. phaeocomoides (Berk. & Br.) Wint. (*P. vulgaris* Niessl): on 1 Mack [250].

P. phaeocomoides var. *infectoria* (Fckl.) Wehm. (*P. i.* Fckl.): on 3 Greenl [602, 603].

P. scrophulariae (Desm.) Höhn.: on 3 Frank [604].

Selenophoma drabae (Fckl.) Petr. (*Rhabdospora d.* (Fckl.) Berl. & Vogl.): on 3 Yukon [600].

Xanthomonas papavericola (Bryan & McWhorter) Dowson: bacterial blight, brûlure bactérienne: on 2 PEI 56:130; on 4 Ont 1940, 44:114; 4 Ont, 5 Ont Que 45:118.

Aster yellows virus (callistephus virus 1): aster yellows, jaunisse de l'aster: on *P. sp.* Alta 58:118, NB 35:71; on 1 Man 45:118.

Boron deficiency, carence de bore: on *P. sp.* PEI 51:117.

Parnassia L.

SAXIFRAGACEAE

Perennial smooth herbs of the northern hemisphere.

1. *P. katzebuei* Cham.; Greenl, Labr, Nfld and Que to Hudson Bay and Alaska; also in n.e. Asia.

2. *P. palustris* L., grass of Parnassus, fleur du Parnasse; Eurasia and Alaska; as *P. p.* var. *neogaea* Fern., Nfld to Alaska.

3. *P. parviflora* DC.; Alaska to Nfld, NS, PEI, Que and Ont.

Mycosphaerella parnassiae (Rostr.) Lind: on 1 Yukon [604].

Puccinia uliginosa Juel: I only on 2 Alaska [15, p. 212; 175]; ? on 2 Man [93, p. 71].

Synchytrium aureum Schroet.: on 3 BC [541].

Parrya R.Br.

CRUCIFERAE

Perennial herbs of alpine and arctic regions.

1. *P. arctica* R.Br. (*Matthiola a.* (R.Br.) ?auct.); arctic Canada and e. Asia.

2. *P. nudicaulis* (L.) Regel (*P. macrocarpa* R.Br., *Matthiola n.* (L.) auct.); circumpolar, arctic Eurasia, Alaska, Yukon and Mack.

Leptothyrium vulgare (Fr.) Sacc. f. *parryae* Sacc.: on 2 Alaska [175].

Mycosphaerella tassiana (de Not.) Johans. (*M. pachyasca* (Rostr.) Vesterg.): on 1 Mack [250], Frank [600, 604].

Pleospora comata Auersw. & Niessl (*Pyrenophora c.* (Niessl) Sacc.): on 2 Yukon [600, 604].

P. herbarum (Fr.) Rabh.: on 1 Mack [175].

P. penicillus (Schm.) Fckl. var. *p.* (*Pyrenophora chrysospora* (Niessl) Sacc.): on 1 Frank [600]; on 2 Alaska [175, 250].

Puccinia oudemansii Tranz.: III on 2 Alaska [15, p. 290; 175].

Parthenocissus Planch.

VITACEAE

Woody climbers of N. America and Asia.

1. *P. inserta* (Kerner) K.Fritsch.; in Canada from NS and Que to Man.

2. *P. quinquefolia* (L.) Planch. (*Ampelopsis q.* (L.) Michx., *Psedera q.* (L.) Greene), Virginia creeper, vigne vierge; in Canada from Que to Man.

3. *P. tricuspidata* (Sieb. & Zucc.) Planch., Boston ivy; native to Asia and locally escaped from cult. in the US.

Cercospora ampelopsidis Pk.: leaf spot, tache cercosporéenne: on 2 Man 36:85, Ont Que 48:111.

C. arboreae Tharp: on 2 Man [93, p. 114]; probably not distinct from *C. ampelopsidis*, cf. 48:111.

Guignardia bidwellii (Ell.) Viala & Ravaz (stat. conid. *Phyllosticta viticola* (Berk. & Curt.) Thüm.): leaf spot, pourriture noire: on 2 Ont [93, p. 136], 43:113; ? on 3 Ont 62:90.

Phleospora ampelopsidis (Ell. & Ev.) Bubák (*Septoria a.* Ell. & Ev.): leaf spot, tache foliaire: on 2 Que 57:118.

Plasmopara viticola (Berk. & Curt.) Berl. & de Toni: downy mildew, mildiou: on 1, 2 Ont, 2 Que 43:113; on 2 Ont 48:111.

Uncinula necator (Schw.) Burr.: powdery mildew, blanc: on *P. sp.* BC [50]; on 2 Alta 53:120, Sask Man [93, p. 45], Ont 31:103, Que PEI 26:33, NS 51:117, PEI [1138].

Pastinaca L.

UMBELLIFERAE

Tall biennial or perennial herbs of Europe and Asia; one commonly cult. for its large edible root.

1. *P. sativa* L., parsnip, panais; cult. and naturalized from Europe in Canada from BC to Nfld, particularly common in Ont and Que.

Low-temperature basidiomycete, basidiomycète frigophile: isolated from 1 Alta [215].

Botrytis cinerea Pers.: gray mold, moisissure grise: on roots of 1 Sask 52:52, NS 50:60.

Cercospora pastinacae (Sacc.) Pk. (*C. apii* auct.): early blight, brûlure cercosporéenne: recorded on 1 Ont NS 35:30, Que 40:38, NB 61:72, PEI 25:48, [cf. 1138]. Although *C. pastinacae* is a distinct pathogen, Canadian specimens so determined proved to be *Ramularia pastinacae* (q.v.), 43:54; however, recent DAOM accessions of specimens collected in 1933 and 1941 in Ont were *C. pastinacae*.

Erwinia carotovora (L.R.Jones) Holland: soft rot, pourriture molle: on 1 BC 43:54.

Fungi from seed: of 1: *Alternaria consortialis* (Thüm.) Groves & Hughes, Conn; *A. tenuis* auct. sensu Wilts., PEI Calif; *Aspergillus niger* van Teigh., Calif; *Aureobasidium pullulans* (de Bary) Arn., England; *Bipolaris sorokiniana* (Sacc. in Sorok.) Shoem., Ont; *Chaetomidium fimeti* (Fckl.) Zopf, *Chaetomium cochliodes* Pall., Calif; *C. globosum* Kze., BC; *C. murorum* Cda., Mich; *Chlamydomyces palmarum* (Cke.) Mason, Ont; *Cladosporium cladosporioides* (Fres.) De Vries, BC; *C. herbarum* Lk., Calif; *C. malorum* Ruehle, Minn; *Epicoccum nigrum* Lk., BC [374]; *Fusarium equiseti* (Cda.) Sacc., *F. poae* (Pk.) Wr., PEI [334, 374]; *Gelasinospora tetrasperma* Dowding, BC; *Melanospora papillata* Hotson, *Oospora lactis* Fres., Conn; *Periconia pycnosporea* Fres., BC; *Rhizoctonia solani* Kühn, Minn; *Rosellinia limoniiformis* Ell. & Ev., Iowa; *Sordaria fimicola* (Rob.) Ces. & de Not., Ont; *S. inaequalis* Cain, *Sporormia intermedia* Auersw., Conn; *Stachybotrys chartarum* (Ehr.) Hughes, Mich; *Stemphylium botryosum* Wallr., BC [374].

Fusarium spp.: *F. equiseti* and *F. oxysporum* Schlecht. were isolated from basal parts of wilted plants of 1 Man 38:36, [335]; *F. o.* var. *redolens* (Wr.) Gordon from shrunken plants Man, *F. solani* (Mart.) App. & Wr. from decayed tap roots Ont [335].

Itersonilia perplexans Derx: canker, chancre: on 1 Ont 56:63, NB 59:50, NS 62:55; this little known pathogen appears to be very destructive.

Meloidogyne sp. (*Heterodera marioni* (Cornu) Goodey): root-knot nematode, nodosité des racines: on 1 BC 52:52, [535], Que 47:53.

Phleospora crescentium (Barth.) Riley [866, p. 215] (*Cylindrosporium c.* Barth.): leaf spot, tache phleoporéenne: on 1 Man 38:36, 42:48, 43:54, [93, p. 129].

Phomopsis canadensis Bubák & Dearn.: stem blight, brûlure phomopsienne: on 1 Ont (Sacc., Syll. Fung. 25:137. 1931), PEI 46:40.

Ramularia pastinacae (Karst.) Lindr. & Vestergr. (*Cercospora p.* Karst.): leaf spot, tache ramularienne: on 1 BC 40:38, Alta 43:54, Man [93, p. 125], Ont 46:40, NB 26:24, NS 39:43; common and occasionally destructive in garden patches NS 54:68, and seed crops BC [535], [cf. 1138]. When specimens available in 1943 were critically studied, spores of *Ramularia* predominated in the collections, but some spores of *Cercospora* were also present. The fungus is evidently pleomorphic, a condition already

demonstrated in *Ramularia vallisumbrosae* Cav. (*Cercospora narcissi* Boud.) on *Narcissus*, 43:54.

Rhizopus spp.: on roots of a seed crop of 1 BC [535].

Sclerotinia sclerotiorum (Lib.) de Bary: sclerotinia rot, pourriture sclérotique: on 1 in field, BC 41:38, in seed crops [535], Alta 42:48, PEI 43:55; on roots in storage, Sask Man [93, p. 42], PEI 44:50.

Streptomyces scabies (Thaxt.) Waks. & Henrici (*Actinomyces s.* (Thaxt.) Güssow): scab, gale commune: on 1 Alta 43:54, PEI 42:48, Nfld 53:62; usually a minor disease of parsnips.

Aster yellows virus (callistephus virus 1): aster yellows, jaunisse de l'aster: on 1 BC 43:55, Alta 48:45, Man 44:50, NB 36:27; NS 40:38, PEI 49:50; much less prevalent on parsnips than on carrots NS 44:50.

Pedicularis L.

SCROPHULARIACEAE

Mostly perennial herbs of the northern hemisphere.

1. *P. bracteosa* Benth. (*P. paddonensis* Pennell); Alta and BC to Idaho and Wash.
2. *P. canadensis* L., common lousewort or woodbetony, pédiculaire du Canada; in Canada from Que to Man.
3. *P. capitata* Adams; Keew, Mack and Alaska.
4. *P. flammea* L., red rattle; arctic regions of Canada and s. to Nfld and Que.
5. *P. hirsuta* L.; Yukon, Alaska and e. Asia.
6. *P. labradorica* Wirsing (*P. euphrasioides* Steph.); Greenl, Labr and Que to Alaska and BC.
7. *P. lanata* Cham. & Schlecht. (*P. sudetica* Willd. var. *l.*); Greenl and Labr to Alaska, BC and Eurasia.
8. *P. langsдорffii* Fisch. (*P. arctica* R.Br.); Alaska and e. Asia.
9. *P. lapponica* L.; Greenl to Alaska and Eurasia.
10. *P. racemosa* Dougl. ex Hook.; BC to Calif.
11. *P. sudetica* Willd.; Ont, Man and Keew to Yukon, Alaska and BC.

Apiosporella alpina Wehm.: on 1 BC [50].

Cladosporium herbarum Lk.: on 5 Greenl [602, 604].

Dendryphion nanum (Nees) Hughes (*Helminthosporium n.* Nees): on 6 Greenl [899].

Didymella pedicularis Arx.: on *P.* sp. Que [52].

Diplodina euphrasiae (Oud.) Allesch.: on 11 Frank [604].

D. pedicularidis (Fckl.) Lind (*Gloeosporium p.* Rostr.): on 4, 8 Keew, 5 Greenl, 8 Frank [971]; on 5 Greenl [901, p. 11]; on 7 Frank [605].

Eriosphaeria herbarum Wehm.: on 1 BC [50].

Heteropatella umbilicata (Pers. ex Fr.) Jaap (*Septoria cercosperma* Rostr.): on 4 Greenl [903]; on 5 Greenl [901, 903].

Mycosphaerella pedicularis (Karst.) Lind (*Sphaerella p.* Karst.): on 5, 7 Greenl [899]; on 7, 11 Frank [604]; on 11 Mack [250].

Pedicularis

- Mycosphaerella tassiana* (de Not.) Johans. (*M. pachyasca* (Rostr.) Vestergr.): on *P. sp.* BC [50]; on 5 Greenl [602]; on 7 Frank [600]; on 8 Frank [604].
- M. tassiana* var. *tassiana*: on 5 Frank [52].
- Pellicularia filamentosa* (Pat.) Rogers (*Thanatephorus cucumis* (Frank) Donk): on 9 Frank [971].
- Phoma sp.*: on *P. sp.* Frank [250].
- P. complanata* (Tode ex Fr.) Desm.: on 7 Frank [600].
- P. herbarum* West.: on 5 Greenl [902]; on 5, 9 Greenl [899]; on 7 Greenl [900].
- P. irregularis* Rostr.: on 5 Greenl [899, p. 568]; on 9 Greenl [900].
- P. sceptri* Karst.: on 4, 5, 6, 9 Greenl [899]; on 4, 5, 9 Greenl [903].
- Pleospora androsaces* Fckl. (*Pyrenophora a.* (Fckl.) Sacc.): on 3 Alaska, 12 Frank [604]; on 5 Greenl [602].
- P. cerastii* Oud. (*Pyrenophora c.* (Oud.) Lind): on 3, 8 Greenl [603]; on 7 Alaska [175, 604], Frank [604].
- P. comata* Auersw. & Niessl (*Pyrenophora c.* (Niessl) Sacc.): on 3, 7 Frank [600]; on 5 Greenl [601]; on 5, 11 Greenl [604]; on 9 Greenl [899].
- P. helvetica* Niessl: on *P. sp.* Que, 5 Frank [52].
- P. herbarum* (Fr.) Rabh.: on 3 Greenl [903]; on 5 Greenl [899, 902]; on 7 Frank [52, 903].
- P. penicillus* (Schm.) Fckl. var. *p.* (*P. chrysospora* Niessl (*Pyrenophora c.* (Niessl) Sacc.): on 5 Greenl [602, 899], on 8 Greenl [603].
- P. phaeocomoides* (Berk. & Br.) Wint. (*P. vulgaris* Niessl): on 4, 5 Greenl [899]; on 5 Greenl [903].
- P. setigera* Niessl (*Pyrenophora s.* (Niessl) Sacc.): on 7 Mack [604].
- P. tragacanthae* Rabh.: on 1 BC [50].
- Puccinia clintonii* Pk.: III on 1 BC [1138], Alta [13, p. 564]; on 2 Ont Que [828], [cf. 15, p. 336].
- P. helicalis* Savile: III on 3 Frank Keew Alaska [959, p. 981], Frank Mack Yukon [971], Frank [962].
- Schizoxylon berkeleyanum* (Dur. & Lév.) Fckl.: on 7 Greenl [900].
- Sphaerella trichophila* Karst.: on 4 Greenl [903]; on 4, 5, 6 Greenl [899].
- Sphaerotheca fuliginea* (Schlecht. ex Fr.) Poll.: on 3 Frank Keew Yukon [971].
- Synchytrium sp.*: on 10 BC [541].

Pelargonium L'Her.

GERANIACEAE

Herbaceous perennials or subshrubs, mostly of S. Africa; some much grown for ornament.

1. *P. domesticum* Bailey, show or fancy geranium, géranium; a cultigen descended from several S. African species.
2. *P. hortorum* Bailey, fish geranium; a cultigen.
3. *P. zonale* (L.) Ait., zonal or horseshoe geranium, géranium à corbeilles; native to S. Africa, but probably only a cultigen of the species now in cult.

Agrobacterium tumefaciens (Sm. & Towns.) Conn: crown gall, tumeur de collet: on *P. spp.* BC 57:128, Sask 52:117, Ont 34:84; rare.

Botrytis cinerea Pers.: gray mold, moisissure grise: on *P. spp.* Alaska [175], BC 52:117, Ont 56:130, PEI 33:68; on imported cuttings Alta 53:131; on 3 BC 55:125, Man [93, p. 113], [cf. 1138]. The pathogen

is most destructive as a basal stem rot of cuttings being propagated in the greenhouse BC 56:130, Ont 57:128; it may also attack the leaves and flowers BC 38:106, [535], Que 51:17, PEI 32:89, 50:30.

Cercospora brunkii Ell. & Gall.: leaf spot, tache cercosporéenne: on *P. spp.* Ont 31:92, ? NB 29:68, [1138].

Corynebacterium fascians (Tilf.) Dowson: fasciation, fasciation: on *P. sp.* Ont 62:98.

Fusarium spp.: stem rot, pourridié fusarien: on *P. spp.* Que 38:112, PEI 61:116. *F. solani* (Mart.) App. & Wr. was isolated from decayed basal parts of 2 Man [335].

Meloidogyne sp.: root-knot nematode, nodosité des racines: on *P. sp.* Ont 59:90.

Pseudomonas erodii Lewis: bacterial leaf spot, tache bactérienne: on *P. spp.* Ont 26:34, 35:67, NS 27:95, [cf. 1138].

Pythium debaryanum Hesse var. *pelargonii* H. Braun: on 3 in greenhouse Man 31:92, [93, p. 31].

P. ultimum Trow and *P. spp.*: basal stem rot, pourridié pythien: on *P. spp.* Sask PEI 33:68, Ont 46:87, Que 58:119, [cf. 93, p. 31].

Verticillium albo-atrum Reinke & Berth. or *V. dahliae* Kleb.: verticillium wilt, flétrissure verticillienne: on *P. spp.* BC 52:117, 62:98, Ont 58:119.

Xanthomonas pelargonii (N.A. Brown) Starr & Burkh.: bacterial leaf spot and stem rot, pourriture bactérienne: on *P. spp.* BC [535], Ont 58:119, NS 59:90; the disease may be severe.

Cucumber mosaic virus: mosaic, mosaïque du concombre: on *P. spp.* Ont NB 49:109.

Pelargonium leaf-curl virus (pelargonium virus 1): leaf curl or crinkle, frisolée: on *P. spp.* BC 39:106, [535], Sask NB 54:135, Ont 37:76, 49:109, 57:128, Que 46:113, 62:98, NS 42:104; cause of heavy loss in 1 Ont [67].

Tomato spotted wilt virus: spotted wilt, tache de bronze: on *P. spp.* Que 44:114.

Iron deficiency, carence de fer: chlorosis, chlorose: on *P. spp.* Man 45:118.

Potassium deficiency, carence de potasse: on *P. sp.* in greenhouse PEI 50:130.

Unbalanced water relations, déséquilibre hydrique: oedema, œdème: on *P. spp.* BC 55:125, Sask 58:119, Ont 26:34, 57:128.

Penstemon Mitchell SCROPHULARIACEAE

Perennial herbs almost entirely confined to N. America.

1. *P. acuminatus* Dougl.; almost certainly a mis-determination; probably the host is 2.
2. *P. albidus* Nutt., white beard-tongue, penstémon blanc; in Canada from Man to Alta.
3. *P. confertus* Dougl.; BC and Alta to Mont, Wash and Oreg.
4. *P. ellipticus* Coult. & Fisch.; in Canada in BC and Alta.
5. *P. erianthus* Pursh; in Canada in Alta and BC.
6. *P. fruticosus* (Pursh) Greene; Alta to Mont, Wash and Oreg.
7. *P. grandiflorus* Nutt.; Wis to Wyo and south; spread from cult.

8. *P. hirsutus* (L.) Willd.; in Canada in s. Que and s. Ont.
9. *P. nitidus* Dougl.; in Canada from s. Alta to s. Man.
10. *P. ovatus* Dougl.; BC to Ore.
11. *P. procerus* Dougl.; Alaska, Yukon, Sask and Alta to Colo and Calif.
12. *P. secundiflorus* Benth.; Wyo and NM.
13. *P. serrulatus* Menz.; Alaska to Ore.
14. *P. tolmiei* Hook.; BC and Wash.
15. *P. unilateralis* Rydb.; Wyo to NM.

Ascochyta sp.: leaf spot, tache ascochytiq: on *P. sp.* Man; may be a state of *Phyllosticta penstemonis* Cke., 45:118.

Cercospora penstemonis Ell. & Kell.: leaf spot, tache cercosporéenne: on 10, 13 cult. BC [535].

Dimerum alpinum Cke.: on 6 BC [50].

Erysiphe cichoracearum DC. ex Méral: powdery mildew, blanc: on *P. sp.* BC 34:88, [50].

Fusarium spp.: *F. acuminatum* Ell. & Ev. and *F. oxysporum* Schlecht. isolated from diseased or discolored parts of 11; *F. avenaceum* (Fr.) Sacc. from a leaf spot Man [335].

Mycosphaerella tassiana (de Not.) Johans.: on 10 BC [50].

Pleospora herbarum (Fr.) Rabh. var *occidentalis* Wehm.: on 14 BC [50].

Puccinia andropogonis Schw.: rust, rouille: 0 I on 1, 5 Sask [15, p. 121]; on 1 Man, 2, 5, 9 Sask [93, p. 65]; on 4 BC [1198]; on 8 Ont [828].

P. palmeri Diet. & Holw.: 0 I III on 3 BC [1138; cf. 15, p. 333].

Ramularia sp.: leaf spot, tache ramularienne: on 7, 12, 15 cult. Man 38:106, 40:96, 43:113; probably not distinct from *R. nivosa*.

R. nivosa (Ell. & Ev.) W.B.Cke. & C.G.Shaw [207, p. 127]; on 13 BC DAOM 43957.

Septoria pentstemonicola Ell. & Ev.: on 1 Man [93, p. 139].

Pereskia Mill.

CACTACEAE

Trees, shrubs and vines of Mexico, the West Indies, Central and S. America.

1. *P. aculeata* Mill., Barbados gooseberry or lemon-vine, cerise de Surinam; widespread in tropical America.

Virus: mosaic, mosaïque: on 1 NB 43:121.

Petalostemum Michx.

LEGUMINOSAE

Mostly perennial herbs of N. America.

1. *P. candidum* (Willd.) Michx., white prairie-clover; in Canada from Ont to Alta.
2. *P. occidentale* (Gray) Fern. (*P. oligophyllum* (Torr.) Rydb.); in Canada from Alta to Man.
3. *P. purpureum* (Vent.) Rydb., thimble weed; in Canada from Alta to Man.

Puccinia andropogonis Schw.: 0 I on 1, 3 Man [93, p. 65; cf. 15, p. 122].

Synchytrium aureum Schroet.: on 1 Man [93, p. 29].

Uropyxis petalostemonis (Farl.) de Toni or *U. affinis* Arth.: III on 2 Sask [93, p. 73; cf. 15, p. 76].

Petasites Mill.

COMPOSITAE

Perennial woolly herbs of temperate and arctic regions of the northern hemisphere.

1. *P. frigidus* (L.) Fr. (*P. corymbosus* (R.Br.) Rydb.); BC, Alaska, Yukon, Frank and Eurasia.
2. *P. palmatus* (Ait.) Gray; Labr, Nfld and NS to BC and Yukon.
3. *P. sagittatus* (Pursh) Gray; Labr to BC and Alaska.
4. *P. vitifolius* Greene (*P. hyperboreus* Rydb.); Labr, Que and Man to Alta, BC, Yukon and Alaska.

Ceratobasidium anceps (Bres. & Syd.) Jackson: on 2 Ont [495].

Phyllosticta petasitidis Ell. & Ev.: on 3 Man [93, p. 136].

Puccinia conglomerata (Strauss) Röhling: III on 1 Alaska [175], BC 33:116; on 1 BC Alta, 2 Alta Sask Ont [15, p. 346]; on 2 BC [1198], Sask 29:77, Sask Man [93, p. 67]; on 2, 4 Ont, 3 Que [828].

P. poarum Niels.: 0 I on *P. sp.*, 1, 3, 4 Alaska [175]; on 1 Alaska [15, p. 164]; the II III states on *Poa* are unknown in N. America.

Ramularia variegata Ell. & Holw.: on 2 Man [93, p. 125].

Stagonospora petasitidis Ell. & Ev.: on 2 BC [1199], Man [93, p. 141].

Petroselinum Hoffm.

UMBELLIFERAE

Chiefly biennial herbs of Europe and the Mediterranean region; one cult. for culinary decoration.

1. *P. crispum* (Mill.) Mansf. (*P. hortense* Hoffm., *P. sativum* Hoffm.), parsley, persil; native to Europe, commonly cult. and occasionally escaped.

Botrytis cinerea Pers.: on 1 Alaska [175].

Fungi from seed: of 1: *Alternaria tenuis* auct. sensu Wiltshire, BC Calif; *Aspergillus niger* van Tiegh., Conn [374]; *Chaetomium cochliodes* Pall., [1009]; *C. elatinum* Kze. & Schm., Calif NJ; *C. erectum* Groves & Skolko, Conn [1008]; *C. murorum* Cda., Ohio; *C. succineum* Ames, Calif [1009]; *Cladosporium cladosporioides* (Fres.) De Vries, Calif; *Cunninghamella elegans* Lendner, Calif Conn; *Oospora lactis* Fres., Pa; *Septoria petroselini*, BC; *Sordaria inaequalis* Cain, Ohio Calif; *Sporormia gigaspora* Fekl., Calif; *Stemphylium botryosum* Wallr., Calif; *S. radicinum* (Meier et al.) Neerg., Calif [374].

Aster yellows virus (callistephus virus 1): aster yellows, jaunisse de l'aster: on 1 Man 55:66, NB 31:42, NS 61:72.

Petunia Juss.

SOLANACEAE

Clammy herbs mostly of S. America; a few grown as annuals for their showy flowers.

1. *P. hybrida* Vilm., common garden petunia, pétunia ou Saint-Joseph; a cultigen.

Ascochyta petuniae Speg.: leaf spot, tache ascochyte: on *P. sp.* Que 58:119.

Botrytis cinerea Pers.: gray mold, moisissure grise: on blossoms of *P. sp.* BC [535].

Erysiphe cichoracearum DC. ex Méral: powdery mildew, blanc: on *P. sp.* Man Ont 38:107; on 1 Man [93, p. 44]. Only the oidial state on this host is known; the fungus may be *E. polyphaga* Hammarlund, cf. 48:105.

Meloidogyne sp.: root-knot nematode, nodosité des racines: on *P. sp.* Ont 58:120.

Phytophthora infestans (Mont.) de Bary: late blight, mildiou: on *P. sp.* Que 58:120, PEI 32:93, [1138].

Sclerotinia sclerotiorum (Lib.) de Bary: sclerotinia rot and wilt, flétrissure sclérotique: on *P. sp.* Alta 31:99, Man 56:130, Ont 51:177, Que 32:93.

Thielaviopsis basicola (Berk. & Br.) Ferr.: black root rot, pourridié noir: on *P. sp.* Ont 51:117.

Aster yellow virus (callistephus virus 1): aster yellows, jaunisse de l'aster: on *P. sp.* BC 44:114, Alta 38:107, Sask 37:81, Man Ont 44:114, NB 35:71; sometimes prevalent Man 44:114, NB 49:109.

Potato virus Y (solanum virus 2): mosaic, mosaïque: on *P. sp.* NB 40:96, 41:96. Other virus or viruslike diseases reported on *P. sp.* are: bunch top, NB 50:130; leaf curl, NB 44:104; mosaic, BC 46:87, Sask 31:99; virescence, NB 43:113, 44:114.

Iron deficiency, carence de fer: chlorosis, chlorose: on *P. sp.* Sask 50:130.

Phacelia Juss.

HYDROPHYLLACEAE

Annual or perennial herbs of N. and S. America; some grown in the flower garden.

1. *P. heterophylla* Pursh; Mont to Wash and south to Calif.
2. *P. leptosepala* Rydb.; BC to Wash, Ore and Mont.
3. *P. leucophylla* Torr.; BC to Wash, Mont, Colo and Calif.
4. *P. sericea* (Graham) Gray; BC to Wash, Ore and Calif.

Mycosphaerella tassiana (de Not.) Johans.: on 3 BC [50].

Ophiobolus rudis (Riess) Rehm: on 2 BC [50].

Pleospora coloradensis Ell. & Ev.: on 3 BC [50].

P. comata Auersw. & Niessl: on 4 BC [50].

P. phaeocomoides (Berk. & Br.) Wint. (*P. vulgaris* Niessl): on 3 BC [50].

P. tragacanthae Rabh.: on 4 BC [50].

Puccinia recondita Rob. ex Desm. (*P. rubigo-vera* Wint.): 0 1 on 1 BC [15, p. 182].

Phalaris L.

GRAMINEAE

Annual or perennial grasses of temperate regions.

1. *P. arundinacea* L., reed grass, roseau; Nfld to Alaska. 1a, *P. a.* var. *picta* L.

2. *P. canariensis* L., Canary or birdseed grass, graines d'oiseaux; adventive from Europe but rarely persistent.

Claviceps purpurea (Fr.) Tul.: ergot, ergot: on 1 Alta Man Que, 2 Alta [1034]; on 1 Alta 30:97, Man [93, p. 45], Que 32:104; on 2 Alta 45:43; 1 was infected artificially with inoculum from rye Alta [172].

Colletotrichum graminicola (Ces.) G.W.Wils.: on 1a Alaska [1037].

Cylindrosporium phalaridis Sacc. & Dearn.: on 1 Sask [93, p. 130].

Drechslera tritici-repentis (Died.) Shoem.: on 1 Ont [993].

Fusarium nivale (Fr.) Ces.: on 1a Alaska [1037].

Leptosphaeria fuckelii Niessl: on 1 BC [50].

Phaeoseptoria festucae Sprague: on 1a Alaska [1042].

Puccinia coronata Cda.: crown rust, rouille couronnée: II III on 1 NS 53:52, [cf. 15, p. 152].

P. graminis Pers.: stem rust, rouille de la tige: II III on 1 Sask Man, 2 Man [93, p. 68; cf. 15, p. 174].

P. sessilis Schneid. ex Schroet.: leaf rust, rouille des feuilles: II III on 1 Sask Man [93, p. 71], Man Ont [15, p. 131], NS 51:41, [1138].

Pythium graminicola Subram. (*P. arrhenomanes* Drechs. var. *canadensis* Vant. & Truscott): on 1 Sask 34:7, [93, p. 31; 1034].

Rhynchosporium secalis (Oud.) Davis: on 1 Sask [93, p. 126].

Phaseolus L.

LEGUMINOSAE

Annual or perennial, mostly herbs, native mainly to warm or tropical countries; cult. for their edible seeds and pods and rarely for ornament.

1. *P. coccineus* L. (*P. multiflorus* Lam.), scarlet runner bean, haricot à rames; perennial but grown as an annual, native to tropical America.
2. *P. limensis* Macf., lima bean, fève de Lima; perennial grown as an annual, probably native to tropical America.
3. *P. vulgaris* L., kidney bean, fève à beurre; annual of tropical America; occurs in many horticultural types.

Other host: 4, *P. acutifolius* Gray var. *latifolius* Freem.

Ascochyta boltshauseri Sacc. and *A. phaseolorum* Sacc.: leaf spot, tache ascochyte: on 3 BC [535].

Botrytis cinerea Pers.: gray mold, moisissure grise: on *P. sp.* Alaska [175]; on 3 BC 37:23, Alta 32:34, Que 39:36, NB-PEI 29:26, 38:28, 44:37, [1138];

sometimes destructive as a pod rot in beans picked for canning BC 54:57, NS 52:42.

Colletotrichum lindemuthianum (Sacc. & Magn.) Bri. & Cav.: anthracnose, anthracnose: on 3 Alaska [175], BC-PEI 24:32, interior BC 36:21, Nfld 51:42, [cf. 93, p. 129; 1138]. In moist seasons the disease may be very prevalent and cause heavy losses Ont 46:32, Que 28:54, NS 31:32, 48:36. The fungus is one of the best-known seed-borne pathogens and freedom of the seed from infection largely determines the level of infection in wet seasons. The early white bean cultivar Sanilac appears to be rarely infected Ont 57:51.

Corynebacterium flaccumfaciens (Hedges) Dowson: bacterial wilt, flétrissure bactérienne: from seed of 3 Ont [832].

Criconeoides curvatum Raski: ring nematode, nématose des racines: on 3 BC 53:53.

Erysiphe polygoni DC. ex Méral: powdery mildew, blanc: on 3 Ont 46:33, Que 25:41.

Fungi from seed: of 1 in BC: *Alternaria brassicicola* (Schw.) Wiltshire, *A. consortialis* (Thüm.) Groves & Hughes, *A. tenuis* auct. sensu Wiltshire, *Botrytis cinerea* Pers., *Cladosporium cladosporioides* (Fres.) De Vries, *Fusarium culmorum* (W.G.Sm.) Sacc., *Melanospora papillata* Hotson, *Penicillium nigricans* Bainier, *Stemphylium botryosum* Wallr., *Trichothecium roseum* (Pers.) Lk. [374]. Of 3: *Acremoniella atra* (Cda.) Sacc., Ont; *A. verrucosa* Togn., Que; *Alternaria tenuis*, BC Ont; *A. consortialis*, BC; *Ascodesmis echinulata* Bainier, Ont; *Aureobasidium pullulans* (de Bary) Arn., BC; *Bipolaris sorokiniana* (Sacc. in Sorok.) Shoem., *Cephalosporium acremonium* Cda., *Chaetomium cochliodes* Pall., Ont; *C. globosum* Kze., BC Ont Calif; *C. indicum* Cda., Ont; *Cladosporium cladosporioides*, BC; *C. herbarum* Lk., *Colletotrichum lindemuthianum* (Sacc. & Magn.) Bri. & Cav., Ont [374]. *Fusarium acuminatum* Ell. & Ev., Man Ont; *F. culmorum*, BC; *F. equiseti* (Cda.) Sacc., BC Man Ont [334]. *F. poae* (Pk.) Wr., Man [334], Ont [374]. *Gonatobotrys simplex* Cda., *Melanospora papillata*, Ont, Que; *Myrothecium verrucaria* (Alb. & Schw.) Ditm., *Papularia arundinis* (Cda.) Fr., Ont; *Rhizoctonia solani* Kühn, BC Ont; *Sordaria finicola* (Rob.) Ces. & de Not., Ont; *Stachybotrys chartarum* (Ehr.) Hughes, Idaho; *Stemphylium botryosum*, BC; *Trichoderma viride* Pers., *Trichothecium roseum*, Ont [374].

Fusarium solani (Mart.) App. & Wr. f. *phaseoli* (Burkh.) Snyd. & Hansen (*F. s. var. p. Burkh.*): dry root rot, pourridié fusarien: on 3 BC 45:45, [535], Alta 32:34, Man 39:36, Ont 34:29, NS 36:22, [1138]; widespread in s.w. Ont but usually severe in only a few fields Ont 52:42, 61:363.

Fusarium spp.: from plants: *F. acuminatum* Ell. & Ev., basal parts of 1 Man; decayed roots, etc., of 3 Man 40:29, *F. equiseti* (Cda.) Sacc., basal parts of 3 Man; *F. oxysporum* Schlecht., foot-rot affected 1 Man 41:28, roots of 3 Man [335], Ont 56:48; *F. o. var. redolens* (Wr.) Gordon, basal parts of 3 Man [335]; *F. solani* f. *phaseoli*, basal parts of 3 Man [335], Ont 56:48, [335].

Macrophomina phaseoli (Maubl.) Ashby: charcoal rot, pourriture charbonneuse: on 3 Ont 45:45, 47:41.

Phyllosticta phaseolina Sacc.: leaf spot, tache phyllostictéenne: on 3 BC 31:34, NS 24:33.

Pseudomonas phaseolicola (Burkh.) Dowson (*P. medicaginis* Sackett var. *p.* (Burkh.) Stapp & Kotte): halo blight, brûlure aréolée: on 3 BC [535], BC Man 39:36, Alta 37:23, Sask Que PEI 44:37, Ont 40:29, NB 42:37, NS 50:49, [cf. 1138]. The disease was first distinguished in Canada from common blight in 1937 and the organism isolated by Hag-

borg in Man 39:36. Severe infections were first noted in BC Alta Man 39:36, 40:29, but an epidemic was recorded in Ont 46:33, and a destructive outbreak in NS 50:49, 51:42. "Calapproved" disease-free seed from Calif resulted in disease-free seed Alta 43:42, 45:46, and disease-free seed is necessary for bean production in NS 52:42. Specific phages for *P. phaseolicola* and *Xanthomonas phaseoli* (q.v.) were isolated from a mixture of soil, compost and sewage. A rapid phage-plaque-count technique was developed for detection of infected seed lots [543].

P. syringae van Hall: bacterial leaf spot, tache bactérienne: on 2 Ont 53:54; on 3 Ont 52:43.

Pythium spp.: damping-off or root rot, fonte des semis ou pourridié pythien: on 3 Sask 30:39, Ont 35:53, 47:41, 58:48; *P. debaryanum* Hesse, Ont 53:43; *P. ultimum* Trow from pods, Sask 50:49.

Rhizoctonia solani Kühn: damping-off or stem rot, fonte des semis ou rhizoctonie: on 3 BC 44:38, 56:50, Alta 24:33, Ont 49:38, Que 61:62, NS 55:54, PEI 29:26, 45:46, [1138]; occasionally severe.

Sclerotinia sclerotiorum (Lib.) de Bary (*S. libertiana* Fckl.): stem rot, flétrissure sclérotique: on 3 BC 40:30, [535], Alta Sask 50:49, Man 56:50, Ont Que NB NS 24:33, PEI 56:50. The disease occasionally causes severe damage in moist seasons in Que, NB and NS and in crops in irrigated areas in BC and Alta. Losses from pod rot in beans held for canning are sometimes considerable.

Uromyces phaseoli (Rebent.) Wint. (*U. appendiculatus* Lk.): rust, rouille: mostly II III on 3 BC 38:28, [535], Ont 35:24, [15, p. 296], Que 34:28, NB NS PEI 24:33, [cf. 1138]; 0 I recorded in BC 55:54, 56:51. Usually only of sporadic occurrence but widespread severe infections have been observed BC 54:58, Ont 47:41.

Verticillium sp.: root rot, pourridié verticillien: on 2 Ont 52:43.

Xanthomonas phaseoli (E.F.Sm.) Dowson (*Bacterium p. E.F.Sm.*): bacterial blight, brûlure bactérienne: on 3 BC 33:22, BC interior 41:29, Alta-PEI 24:33, [cf. 93, p. 28; 535, 1138]. This disease is widespread and often severe in Canada; in 1938 loss from bacterial blight over 500 acres under irrigation in s. Alta was estimated at \$25,000 to the farmers and a similar amount to the industry, 38:28. The introduction of disease-free seed has somewhat reduced its importance, but heavy losses still occur from time to time. With the isolation of a specific phage of *X. phaseoli* [543], a phage-plaque-count technique for detecting the pathogen in bean seed was developed [545]. In its application, however, it appears that there exist strains of *X. phaseoli* that are not revealed by the phages so far isolated.

X. phaseoli var. *fuscans* (Burkh.) Starr & Burkh.: on 3 Ont 62:46.

Bean mosaic virus (phaseolus virus 1): common bean mosaic, mosaïque commune: on 3 BC 29:25, Alta Sask 30:37, Sask 25:41, Man-NB PEI 24:33, NS 32:32; on 4 Que 44:38, 45:75; on *Vigna sesquipedalis* Fruwirth Que 45:75. These reports are based largely on symptoms exhibited by the affected plants. The disease is frequently reported and occasionally almost every plant is affected Ont 57:62, NB 42:38, NS 61:63, but losses appear to be low.

Bean yellow mosaic virus (phaseolus virus 2): bean yellow mosaic, mosaïque jaune: on 3 BC 49:40, Ont 55:54, NB 45:47, NS 51:43. The presence of BYMV was verified in NB by MacLeod, 45:47, 48:37.

Beet curly-top virus (beta virus 1): curly top, frisolée de la betterave: on 3 BC 35:24, 45:47, 55:54.

Phaseolus

- Clover yellow mosaic virus and white clover mosaic virus: 3 is susceptible to both viruses [860].
 ?Tobacco mosaic virus: tobacco mosaic, mosaïque: on 3 Ont 34:29.
 Bald head: mechanical injury, etc.: on 3 Ont 46:34, 55:55; on 2, 3 Ont 53:54.
 Chemical injury: from 2,4-D, BC NS 50:50, Ont 52:44.
 Iron deficiency, carence de fer: chlorosis, chlorose: lime-induced chlorosis on 3 Man 43:42, 45:47.
 Magnesium deficiency, carence de magnésie: scald, échaudage: on 3 NB 42:39, PEI 43:42, 46:34.
 Manganese deficiency, carence de manganèse: leaf mottle, marbrure des feuilles: on 3 Que 55:55.
 Sun scald, insolation: on 3 BC 39:36, Ont 42:39, 46:35, Que 59:44.

Philadelphus L.

SAXIFRAGACEAE

Erect shrubs of wide distribution in Asia, Europe and N. America.

1. *P. coronarius* L., mock-orange, oranger; native to Europe and s.w. Asia, sometimes escaped in N. America; occurs in many cult. forms.
2. *P. gordonianus* Lindl.; BC to Idaho and Calif.

Ascochyta philadelphi Sacc. & Speg.: leaf spot, tache ascochytiq: on *P. spp.* Ont 56:131, Que 58:105; on 1 Que 55:125.

Coniothyrium olivaceum Bon. var. *philadelphi-coronarii* Sacc.: leaf spot, tache coniothyrienne: on *P. sp.* Que 56:131.

Cytospora pulcherrima Dearn. & Hansbr.: on 2 BC [253].

Phyllactinea guttata (Fr.) Lév. (*P. corylea* (Pers.) Karst.): powdery mildew, blanc: on *P. sp.* BC 53:121.

Pseudomonas syringae van Hall: bacterial blight, brûlure bactérienne: on *P. sp.* NS 51:117.

Septoria philadelphi Ell. & Ev.: leaf spot, tache septorienne: on *P. sp.* BC 55:125.

?Virus: mosaic, mosaïque: on *P. sp.* NS 48:112.

Phippsia (Trin.) R.Br.

GRAMINEAE

Dwarfed tufted perennial grass.

1. *P. algida* (Phipps) R.Br. (*Catabrosa a.* (Phipps) Fries); arctic regions of N. America and Eurasia.

Cladosporium herbarum Lk.: on 1 Greenl [601].

Hendersonia arundinacea (Desm.) Sacc.: on 1 Frank [604], Greenl [602].

Leptosphaeria algida Rostr.: on 1 Greenl [899, p. 560].

L. microscopica Karst.: on 1 Greenl [603].

L. vagans Karst.: on 1 Greenl [601, 602].

Lophodermium arundinaceum (Schröd. ex Fr.) Chev.: on 1 Greenl [602].

Mollisia graminis (Desm.) Karst.: on 1 Frank [903], Greenl [899].

Mycosphaerella pusilla (Auersw.) Johans.: on 1 Frank [903].

M. tassiana (de Not.) Johans. (*Sphaerella t.* de Not.): on 1 Frank [604], Greenl [601, 602, 603, 899, 901].

Pleospora magnusiana Berl.: on 1 Frank [604].

P. phaeocomoides (Berk. & Br.) Wint. var. *infectoria* (Fckl.) Wehm. (*P. i.* Fckl.): on 1 Frank [903].

P. vagans Niessl: on 1 Greenl [902].

Phleum L.

GRAMINEAE

Perennial grasses of cool and temperate regions.

1. *P. alpinum* L.; Greenl, Labr, Nfld and Que to Alaska; also in Eurasia.
2. *P. pratense* L., timothy, mil; widely cult. for hay and pasture, and naturalized from Europe.

Low-temperature basidiomycete, basidiomycète frigophile: winter crown rot, piétin hivernal: on 1 Alaska [1042]; on 2 Alta 43:39. The disease was present in most fields of timothy or mixed stands of timothy and alsike clover, damage sometimes being severe Alta 46:30, [215]. Timothy is moderately susceptible [217]. Under artificial conditions the fungus infected 70% of the plants of 2 and caused moderate damage [218].

Cladosporium herbarum Lk.: on 1 Alaska [1038]; associated with floret sterility of 2 Alta 33:19.

Claviceps microcephala (Wallr.) Tul.: on 2 Man 31:109, NS [1138]; as Bisby [93, p. 45] notes, the fungus is only a form of *C. purpurea*.

C. purpurea (Fr.) Tul.: ergot, ergot: on 2 Alaska [175, 1037], BC 30:35, [50], Alta 31:30, [172], Man 35:22, Ont 54:54, [172], Que 25:20, NS 27:33, PEI 36:10, [cf. 1034, 1138]; 2 artificially infected with ergot from rye [172].

Colletotrichum graminicola (Ces.) G.W.Wils.: anthracnose, anthracnose: on 2 Sask 39:34, [1034], Que 54:54.

Darluca filum (Biv.-Bern.) Cast.: on rust on 1 Alaska [1037].

Drechslera phlei (Graham) Shoem. (*Helminthosporium dictyoides* Drechs. var. *phlei* Graham): on 2 Alta Man 57:25, Ont [993]; the fungus causes an apical blight of the leaves.

Erysiphe graminis DC. ex Méral: powdery mildew, blanc: on 2 Alta 38:25, Man [93, p. 44], [cf. 1034].

Fungi from seed: of 2: *Alternaria tenuis* auct. sensu Wiltshire, *Chaetomium globosum* Kze., *Epicoccum neglectum* Desm., Ont [374]; *Fusarium equiseti* (Cda.) Sacc., Ont [334]; *Oospora lactis* Fres., Que; *Papularia arundinis* (Cda.) Fr., *Rhizopus tonkinensis* Vuill., *Trichoderma viride* Pers., Man [374].

Fusarium acuminatum Ell. & Ev., on 1 Alaska [1037].

F. avenaceum (Fr.) Sacc.: on 1 Alaska [1038].

Fusarium spp.: from 2: *F. avenaceum* from decayed culms Que; *F. solani* (Mart.) App. & Wr. from plants with distorted leaves and culms Ont [335].

Helotium stipae (Fckl.) Cash (*Phialea s.* (Fckl.) Rehm): on 1 Alaska [176, p. 45; 1038].

Heterosporium phlei Gregory: purple spot, tache pourpre: on 1 Alaska [1037, 1038]; on 2 BC-Nfld 31:30, 34:26, 36:20, 39:34, 40:28, 55:21, 58:46, NWT [1034], [cf. 535, 1138]. The fungus appears to be widespread and is sometimes prevalent.

Leptosphaeria eustoma (Fckl.) Sacc., sensu Bres.: on 1 BC [50].

L. herpotrichoides de Not. (*Phaeosphaeria h.* (de Not.) Holm): on 2 Que [53].

Lophodermium arundinaceum (Schröd. ex Fr.) Chev.: on 1 Alaska [1038].

Mastigosporium rubricosum (Dearn. & Barth.) Nannf.: on 1 Alaska [1037].

Microthyrium culmigenum Syd.: on 1 Alaska [1038].

Mycosphaerella lineolata (Rob.) Schroet.: on 2 Que [53].

M. pusilla (Auersw.) Johans. (*Sphaerella p.* Auersw.): on 1 Greenl [899].

M. tassiana (de Not.) Johans. (*Sphaerella t.* de Not.): on 1 BC [50], Greenl [900].

M. tulasnei (Jancz.) Lindau: on 1 Alaska [1038].

Ophiobolus graminis Sacc.: on 2 Alaska [1042].

Passalora graminis (Fckl.) Höhn. (*Scoletotrichum g.* Fckl.): brown stripe, striae brune: on 1 Alaska [1038], Greenl [899]; on 1, 2 Alaska [175, 1037]; on 2 BC 39:34, [535], Alta 28:33, Alta Sask 35:22, Man [93, p. 126], Ont 45:43, NB 60:84, NS 41:26, [1138] Nfld 57:50, [cf. 1034]; from seed of 2 Ont 50:47, 52:41.

Phaeoseptoria festucae Sprague: on 1 Alaska [1039].

Phyllachora graminis (Pers. ex Fr.) Fckl.: tar spot, rayure goudronneuse: on 2 Que 62:45, PEI 25:20, [805, 1034, 1138].

Puccinia graminis Pers. f. sp. *phlei-pratensis* (Erikss. & Henn.) Stakm. & Piem.: stem rust, rouille de la tige: on 2 BC-PEI 24:18, 25:20, 33:18, [cf. 93, p. 68; 1138]; the rust probably causes some reduction in yield. Strains of timothy differ greatly in susceptibility BC 23:35, PEI 39:33. This rust form lives over in the uredinal state; attempts to germinate the teliospores were unsuccessful, 39:33.

P. poae-nemoralis Oth. (*P. poae-sudeticae* Jørgstad): on 1 Alaska [175, 1037, 1038; cf. 15, p. 150].

Pythium debaryanum Hesse: on 1 Alaska [1037].

P. graminicola Subram. (*P. arrhenomanes* Drechs. var. *canadensis* Vant. & Truscott): browning root rot, piétin brun: on 1 Sask 33:20, 34:7, [93, p. 31].

Ramularia pusilla Ung. (*Ovularia p.* (Ung.) Sacc. & D.Sacc.): on 1 Alaska [1037, 1038, 1039].

Rhynchosporium meinersii (Sprague) Arx: on 2 Ont [1041].

Sclerotinia borealis Bubák & Vleugel: from 2 cult. Alaska [592], BC [355, 535].

Selenophoma donacis (Pers.) Sprague & Johns. var. *stomaticola* (Bäuml.) Sprague & Johns.: eye spot, tache ocellée: on 2 Alaska [175, 1037], Alaska Sask [1034], Que 54:54.

Septoria culmifida Karst.: on 2 Alaska [175].

Spermospora subulata (Sprague) Sprague: on 2 Alaska [1042].

Typhula spp.: under artificial conditions, *T. incarnata* Lasch ex Fr. (*T. itoana* Imai) infected 40% of plants of 2 and caused slight to moderate damage; *T. ishikariensis* Imai (*T. idahoensis* Remsberg) infected 75% and caused moderate damage; *T. trifolii* Rostr. infected 10% and caused slight damage [218].

Ustilago salvei Berk. & Br. (*U. striiformis* (West.) Niessl): stripe smut, charbon strié: on 2 BC Man Ont [292], BC 36:20, [535], Man 33:19, [93, p. 62], Ont 30:34, Que 25:20, NB 60:84. As there is no longer doubt concerning the identity of *U. salvei*, this name is preferred to *U. striiformis*, 55:51.

Barley yellow dwarf virus: barley yellow dwarf, nanisme jaune de l'orge: from 2 Ont [1036].

Phlox L.

POLEMONIACEAE

Annual or perennial herbs of the temperate regions mainly of N. America, but also in Asia.

1. *P. diffusa* Benth.; BC to Calif.
2. *P. divaricata* L., blue phlox; in Canada in s.w. Que; cult. and locally naturalized.
3. *P. drummondii* Hook., Texan pride, phlox de Drummond; introduced into cult. from e. Texas.
4. *P. gracilis* (Hook.) Greene; BC to Wash and Calif.
5. *P. hoodii* Richards., moss phlox, phlox de Hood; Alaska, Yukon and Alta to s. Man.
6. *P. longifolia* Nutt.; Wash, Ore and Mont.
7. *P. maculata* L., sweet william; in Canada in s.w. Que; escaped from cult. in E. Canada.
8. *P. paniculata* L., perennial phlox; native to US and also spread from cult.
9. *P. speciosa* Pursh, pride of Columbia; Wash, Ore and Mont.
10. *P. subulata* L., moss pink, barbe de moine; native to e. America and also spread from cult.

Other hosts: 11, × *P. arendsii* Hort. 12, × *P. suffruticosa* Hort.

Low-temperature basidiomycete, basidiomycète frigidophile: on 8 Alta [215].

Botrytis cinerea Pers.: on *P.* sp. Alaska [175].

Cercospora omphakodes Ell. & Holw.: leaf spot, tache cercosporéenne: on 2 Ont 32:93.

Ditylenchus dipsaci (Kühn) Filip.: stem nematode, pourridié nématique: on 8 Ont 55:125.

Erysiphe cichoracearum DC. ex Mèrat: powdery mildew, blanc: on *P.* spp. BC 33:72, [50, 535], Ont Que 24:56, NB 34:89, NS [1138], PEI 32:94; on 3 Que, 7 Ont 44:113; on 8 BC 51:117, Ont 37:81, Ont Que 44:113, NS 54:135, [1138]. The disease is often heavy by late August on 8 in BC and from Ont eastwards; because of its frequent occurrence, it largely "escapes comment," 43:113.

Fusarium spp.: foot rot, pourridié fusarien: on 3, severe, Man; *F. acuminatum* Ell. & Ev., *F. oxysporum* Schlecht. were isolated, 41:96, [335].

Lophiostoma caulium (Fr.) Ces. & de Not.: on 9 BC [50].

Mycosphaerella tassiana (de Not.) Johans.: on *P.* spp. BC [50].

Nectria ?pedicularis (Tracy & Earle) Petr. (*Nectriella p.* (Tracy & Earle) Seav.): on 1 BC [50].

Peronospora phlogina Diet. & Holw.: downy mildew, mildiou: on 10 Snow Queen BC [535].

Platyspora permunda (Cke.) Wehm. (*Clathrospora p.* (Cke.) Sacc., *C. diplospora* (Ell. & Ev.) Wehm.): on *P.* spp., 6 BC [50].

Pleospora comata Auersw. & Niessl.: on *P.* spp. BC [50].

Puccinia douglasii Ell. & Ev.: rust, rouille: 0 I III on 5 Alta Sask [15, p. 255], Sask [93, p. 67].

P. plumbaria Pk.: 0 I III on 2 Ont [828; cf. 15, p. 325].

Phlox

Septoria divaricata Ell. & Ev.: leaf spot, tache septorienne: on *P. spp.* BC 45:119, [535], Ont 38:107, Que 31:99, NB 29:70, as *S. sp.* Alta 37:82; on 2 Man 35:71, 38:107; on 3 Man, sometimes injurious [93, p. 138], PEI 43:113, as *S. sp.* Que NS 35:71, but see below; on 8 Man 42:104, Que 33:11, NS 41:96, [1138].

S. phlogis Sacc. & Speg. (*S. drummondii* Ell. & Ev.): on 3 Alaska [175], Ont 52:118, Que 53:121, NS [1138]; probably not distinct from *S. divaricata* (q.v.), 52:118.

Synchytrium sp.: on 4 BC [540].

Uromyces acuminatus Arth.: rust, rouille: 0 I on *P. sp.* Sask [93, p. 72; cf. 15, p. 168].

Aster yellows virus (callistephus virus 1): aster yellows, jaunisse de l'aster: on *P. spp.* NB 33:72, 34:89, 41:97; on 3 Man 44:115, NB 36:81, NS 60:99, PEI 43:114; on 7 Que 51:118; on 8 Que 45:119, NB 36:81, NS 60:99.

Virus: blight or streak, brûlure ou bigarrure virale: on *P. spp.* Ont NB PEI, 7, 8, 11, 12 Que 41:96; on 8 Que NB 45:119.

Virus: virescence, virescence: on *P. sp.* NB 43:14; on *P. sp.* PEI, 3 NB 44:115.

Iron deficiency, carence de fer: chlorosis, chlorose: on 8 Man 45:119.

Phragmites L.

GRAMINEAE

Tall semicosmopolitan perennial grasses.

1. *P. communis* Trin., common reed grass, roseau; Eurasia; represented in N. America by 1a, *P. c.* var. *berlandieri* (Fourn.) Fern.; in Canada in NS and from Que to BC.

Deightoniella arundinacea (Cda.) Hughes (*Napicladium arundinaceum* (Cda.) Sacc.): on leaves of 1 Sask Man [93, p. 122], Man 34:105.

Graphyllum manitobense Dearn. & Bisby: on 1 Man [93, p. 43].

Hadrotrichum lineare Pk.: on leaves of 1 Man 34:105, [93, p. 119]; this collection should be compared with *H. phragmitis* Fekl. [cf. 478, p. 575].

Hendersonia arundinacea (Desm.) Sacc.: on old stems of 1 Man [93, p. 133].

Lophiostoma arundinis (Fr.) Ces. & de Not.: on old stems of 1 Man [93, p. 52].

Mollisia arundinacea (DC.) Phill.: on old stems of 1 Man [93, p. 40].

Papularia sphaerosperma (Pers.) Höhn.: on old stems of 1 Man [93, p. 122].

Puccinia magnusiana Koern.: rust, rouille: II III on 1 Man [15, p. 156; 93, p. 69], Ont [828].

P. phragmitis (Schum.) Koern.: rust, rouille: II III on 1 Man [15, p. 155; 93, p. 70], Ont, telia causing 0 I on *Polygonum* [828, cf. 830].

Phyllodoce Salisb.

ERICACEAE

Low circumpolar or alpine heathlike evergreen undershrubs.

1. *P. caerulea* (L.) Bab.; arctic regions in Alaska and in Canada from Keew to Labr, Nfld and Que; also in Eurasia.

2. *P. empetriiformis* (J.E.Sm.) D.Don, pink mountain heather; Alaska, Mack, Alta and BC to Calif.

3. *P. glanduliflora* (Hook.) Cov.; Alaska, Alta to Wyo and Ore.

Antennaria rectangularis Sacc.: on 3 Alaska [175].

Diplodina rostrupii Vestergr.: on 3 Alaska [175].

Exobasidium vaccinii-uliginosi Bond. var. *phyllodoce* Savile: on 2 BC [958, p. 653].

Herpotrichiella fusispora Barr: on dead leaves and branches of 1 Labr Que [52, p. 28].

Mycosphaerella tassiana (de Not.) Johans. var. *arctica* (Rostr.) Barr: on 1 Labr [52].

Physalospora hyperborea Bäuml.: on 1 Labr [52], Que [53].

Physalis L.

SOLANACEAE

Low herbs of warm and temperate regions mainly in America; a few grown for their edible fruits and for ornament.

1. *P. alkekengi* L., winter cherry or Chinese lantern, lanterne chinoise; introduced from Asia; an old garden plant.

2. *P. grandiflora* Hook. (*Chamaesaracha g.* (Hook.) Fern.), wild tomato; in Canada from Que to Sask.

3. *P. heterophylla* Nees, wild groundcherry, cerise de terre sauvage; in Canada from Que to Sask.

4. *P. lanceolata* Michx.; in Canada in s. Man, but may be 7.

5. *P. peruviana* L., cape gooseberry, poc-poc; introduced from S. America and locally spread from cult.

6. *P. pubescens* L., batato; widespread in the US and into s.w. Ont.

7. *P. virginiana* Mill., wild groundcherry; in Canada in s. Ont and s. Man.

Aecidium physalidis Burr.: 0 I systemic on 3 Ont, II III unknown; possibly the rust is a species of *Endophyllum* [828; cf. 15, p. 381].

Alternaria solani (Ell. & Martin) Jones & Grout: on 4 Man [93, p. 112].

Entyloma australe Speg.: on leaves of ?4 Man [93, p. 60], on 3, 5, 7 Ont [292].

Puccinia physalidis Pk.: III systemic on 2 Que 33:117; on 3 Ont 30:98; on 3 Man Ont, 7 Man [15, p. 332]; on 7 Man [93, p. 70].

Cucumber mosaic virus: mosaic, mosaïque: on 6 Ont 52:51.

Physostegia Benth.

LABIATAE

Perennial herbs of N. America, grown in borders and wild flower gardens for their showy flowers.

1. *P. virginiana* Benth., false dragonhead, cataleptique; in Canada in NB and Que.

Puccinia physostegiae Pk. & Clint.: III systemic on 1 Ont [828; cf. 15, p. 330].

Sclerotinia sclerotiorum (Lib.) de Bary: wilt, flétrissure sclérotique: on 1 cult. NS 39:106.

Picea A.Dietr.

PINACEAE

Evergreen pyramidal trees native to the cool and temperate regions of the northern hemisphere from the Arctic to the high mts. of warm temperate regions.

1. *Picea abies* (L.) Karst. (*P. excelsa* Lk.), Norway spruce, épinette de Norvège; native to Europe; long cult. and occasionally escaped.
2. *P. engelmanni* Parry, Engelmann spruce, épinette d'Engelmann; in Canada in the interior mt. region of BC and on the e. slope of the Rocky Mts. in Alta. An important forest species used in general construction, interior finish and also for an excellent wood pulp.
3. *P. glauca* (Moench) Voss, white spruce, épinette blanche; across Canada from the Atlantic to Alaska; used widely and extensively for pulpwood and lumber. 3a, *P. glauca* var. *albertiana* (S.Brown) Sarg. (*P. albertiana* S.Brown), western white spruce, épinette blanche de l'ouest; Alaska, BC, Alta and Mont; used extensively for lumber.
4. *P. mariana* (Mill.) BSP., black spruce, épinette noire; entirely across Canada from Nfld to n. BC and Alaska; especially valuable as pulpwood.
5. *P. pungens* Engelm., Colorado blue spruce, épinette du Colorado; native to the mts. of w. US; cult. extensively for its bluish-green foliage. 5a, *P. pungens* var. *kosteriana* Henry, Koster's blue spruce, épinette de Koster.
6. *P. rubens* Sarg. (*P. rubra* (Dur.) Lk. non A.Dietr.), red spruce, épinette rouge; native to NB, NS, PEI and sparingly in s. Que and e. Ont; used extensively for pulpwood, general construction, boxes and crates.
7. *P. sitchensis* (Bong.) Carr., Sitka spruce, épinette de Sitka; confined to the Pacific coast from Alaska to Calif and one of the most important timber species in BC. Because of its large size, it yielded defect-free stock once much prized for aircraft construction.

Aleurocystidiellum subcruentatum (Berk. & Curt.) Lemke (*Aleurodiscus subcruentatus* (Berk. & Curt.) Burt): twig blight, brûlure des rameaux: on *P. sp.* Ont, 3 BC Que [599, p. 278]; on *P. sp.* NS, 3 Que [787]; on 3 BC [1198], NS F53:23, [1138].

Aleurodiscus amorphus (Pers. ex Fr.) Schroet.: on 3 Alta F59:92, [599].

A. canadensis Skolko: on bark of dead twigs and branches of *P. spp.* Ont Que, 3 Que [1007]; on 3 Ont Que [599].

A. fennicus Laurila: on 6 Que [599].

A. hiemalis (Laurila) John Erikss.: on 7 Alaska [1038].

A. laurentianus Jacks. & Lemke: on 4 Que [599].

A. penicillatus Burt: on 3 Que [599]; on 7 BC [599, 1198].

A. piceinus Lyon & Lemke: on *P. sp.* Ont, 6 Que [599, p. 264].

Arceuthobium americanum Nutt. ex Engelm. or *A. sp.*: dwarf mistletoe, faux-gui: on 3 Alta F52:122, F53:129, F54:112, [569, 570]; ? on 2 BC F58:103.

A. campylopodum Engelm.: on 2 BC [570].

A. campylopodum f. *laricis* (Piper) Gill: on 2 BC F60:110.

A. pusillum Pk.: dwarf mistletoe, faux-gui: on 3 Sask Man F53:105, [570], Ont F52:74, Que 35:63; on 4 Sask Man F52:93, 98, Ont F53:86, Que 35:63, F58:37, NB NS F53:23, NS F51:121, Nfld F54:24; on 6 NS 33:63, [569].

Armillaria mellea (Vahl ex Fr.) Kummer: root rot, pourridié-agaric: a common cause of root and butt rot of *P. spp.*; from 2 Alta [280]; from 3 BC [1198], Alta F54:112, Alta-Man F51:141, Sask F52:92, NB F51:119; on 3, 4 Ont F57:50; from 3 NB, 6 NS [242]; on 4 Ont F51:50; fatal to 5 Miami, Man F51:113; from 7 BC [85, 1198].

Ascochyta piniperda Lindau: on 5 Que F56:38.

Asterodon ferruginosus Pat.: on 3 BC [1199].

Atropellis treleasei (Sacc.) Zeller & Goodding (*Godronia t.* (Sacc.) Seav.): on 7 Alaska [977, 979].

Aureobasidium pullulans (de Bary) Arn. (*Pullularia p.* (de Bary) Berk.): common on buds of 3 in areas where defoliation by the spruce bud worm, *Choristoneura fumiferana* (Clem.), was heavy BC F58:99.

Auricularia auricula (Hook.) Underw.: on 3 BC [1198].

Badhamia populina Lister: on bark of fallen *P. sp.* Man [93, p. 25].

Biatorella difformis (Fr.) Wainio: on 3 Ont F62:69.

Bifusella crepidiformis Darker: needle cast, rouge: on 2 Ont type, 4 Ont [236, p. 22]; on 4 Mack F63:104, Nfld F58:28.

Cenangium pinastri Fr.: on bark of *P. sp.* NB; probably a *Tympanis* (q.v.), [1138].

Ceratocystis euophioides Wright & Cain: on or from 3, 4 Ont [1184, p. 1222].

C. sagmatospora Wright & Cain: on sapwood of 4 Ont [1184, p. 1226].

Chrysomyxa arctostaphyli Diet. (stat. aecid. *Peridermium coloradense* Arth. & Kern, *P. boreale* Arth. & Kern, *Melampsorella caryophyllacearum* auct.): witches'-broom rust, rouille-balai de sorcière: 0 I on *P. spp.* BC Yukon F61:125; on 1 cult. Alta 53:108, Man [15, p. 21]; on 2, 3, 4, 7 BC [1198]; on 2, 3, 4 Alta F52:123; on 3, 4, 7 Alaska [175]; on 3 Yukon Alta Sask [15], Yukon [14], Sask Man [93, p. 63], Que 39:98; on 3a BC Alta [15]; on 4 Alta Que Nfld [15], Mack F61:105, Sask Man [93], NB 38:92, NS [1138]; on 6 NS 43:97; on 7 Alaska [15, 1038]. This conspicuous rust is frequently reported, but heavy infections appear to be rare. Peterson [841] has recently reported the connection between the *Peridermium* on *Picea* and the *Chrysomyxa* on *Arctostaphylos*.

C. chiogenis Diet.: needle rust, rouille des aiguilles: 0 I on 3, 4 Ont by inoculation [287, 955]; 0 I probably scarce in nature [955; cf. 15, p. 33].

C. empetri Schroet. ex Cummins: 0 I on 2 BC [947]; on 3 BC [1198], Alta F52:125, F53:129, Que NS

- [947], NS [1138], Nfld F54:25, [955]; on 6 Que by inoculation [288]; occasionally observed on the cones Que 49:96; on 7 Alaska [175, 947].
- Chrysomyxa ledi* de Bary (*C. cassandrae* (Pk. & Clint.) Tranz.): 0 I on 2 BC [1198], Alta [947]; on 3 Alaska Man Ont PEI [947], BC F53:132, [1198], Yukon F62:121; on 4 Alaska [175], BC [1198], Sask [15, p. 34; 93, p. 62], Man Que PEI [947], Ont NS [15], Nfld F53:23; on 5 Ont [15, 947], Alta 53:107; on 6 Ont NS [15], NS [1138]; on 7 BC [947, 1198].
- C. ledi* var. *cassandrae* (Pk. & Clint.) Savile (*Melampsoropsis c.* (Pk. & Clint.) Arth.): 0 I on 3, 6 NS [947]; on 4, 6 by inoculation [310].
- C. ledi* var. *gladulosi* Savile: 0 I on 2 BC [955, p. 489; 1198].
- C. ledi* var. *groenlandici* Savile (*Melampsoropsis abietina* Arth.): 0 I on 6 by inoculation NS [310; cf. 947, sub var. *ledi*; 955].
- C. ledi* var. *rhododendri* (de Bary) Savile (*C. r.* de Bary): 0 I on *P. spp.* NB, 6 NS [1138]; almost certainly misdetermined as the variety is unknown in NB and NS.
- C. ledicola* Lagerh.: needle rust, rouille des aiguilles: 0 I on 2 BC [1198], Alta [15, p. 33], PEI [1138]; on 3 Alaska [175], Alaska Alta Sask Que NB NS [15], Alaska BC Nfld [955], BC [1198], Mack Man Ont Que [947], Sask [93], NS PEI [1138]; on 3a BC [955], Yukon [947]; on 4 Alaska [175, 947], Yukon F59:110, BC [1198], Alta F52:124, Sask Man Ont [93], Ont Que [947], NB NS PEI [1138]; on 5 Alta Man Que PEI [947], Ont [15], NS 54:124, a very susceptible species, 31:86, 54:124; on 5a NS [1138]; on 6 Que [947], NS PEI [15]; on 7 Alaska [15, 175], BC [955, 1198]. In moist seasons species of *Chrysomyxa* are frequently epidemic and may cause severe defoliation; among these species *C. ledicola* is by far the most prevalent. Although the species was not specified, rust occurred in 1938 from the Yukon to Nfld, 39:98. It is occasionally observed on the cones Que 49:96.
- C. monesis* Ziller: cone rust, rouille des cônes: 0 I on 7 BC; aeciospores were used successfully to infect *Moneses* [1196, p. 436], F55:106.
- C. pirolata* Wint. (*C. pyrolae* (DC.) Rostr.): cone rust, rouille des cônes: 0 I on 2 BC [1198], Alta F52:124; on 3 Alaska [555], BC [1198], BC Yukon F62:121, Alta Man F51:143, Sask F53:107, Man [15, p. 32], Ont Que NS [947], Mack [955]; on 3a BC [947]; on 4 Alaska [555], BC [1198], BC NS [947], Alta 48:97, Sask F54:99, Que F56:27; on 5 BC F61:125; on 6 NS 50:115, F53:24, [15, 1138]; on 7 Alaska [175, 555], BC [1198]; on 3 by inoculation Sask [93, p. 62]. One of the more abundant rusts of N. America [947]; loss of cones in some seasons is heavy, as in 1949 in Man, F51:151.
- C. weirii* Jackson: needle rust, rouille des aiguilles: III on *P. sp.* NS [947, 1138]; on 2 BC [15, p. 33; 947, 1198], Alta F53:132; on 3, 7 BC [1198]; on 4 Que F59:42; on 6 NB 38:92.
- C. woronini* Tranz.: 0 I systemic on 3 Alaska BC Nfld [955], BC [1198], Que 49:96, [947]; on 3, 4 Yukon F59:110; on 4 Nfld 51:106, [955].
- Ciboria rufofusca* (Weberb.) Sacc.: on old cones of *P. sp.* Man [93, p. 39].
- Clavariadelphus ligula* (Fr.) Donk: on 3 BC [1198].
- Clitocybe decora* (Fr.) Gill.: recorded on 3 BC [1198].
- Coniophora farida* (Fr.) Karst.: on *P. sp.* Man [93, p. 75].
- C. fusispora* (Cke. & Ell.) Cke.: on bark of *P. sp.* NS [1138].
- C. olivacea* (Pers. ex Fr.) Karst.: common on *P. sp.* Man [93, p. 75]; on 3 BC [1198].
- C. puteana* (Schum. ex Fr.) Karst. (*C. cerebella* Pers.): brown cubical rot, carie brune cubique: causes a rot of coniferous and broad-leaved trees, mostly of the butt and root; on *P. sp.* Man [93]; from 2 Alta Man, 4 Que [280]; on 3 Alaska where it is an important cause of windthrow [555], BC [1198]; from 3, 4 Alta-Man, common, F51:141; from 3 Alta [280], Ont F55:61, NB F51:119; from 3, 4 NB [242]; from 4 Que F57:30, [791]; for characters in culture, see Nobles [791].
- C. suffocata* (Pk.) Masee: on wood of *P. sp.* Man [93, p. 75].
- Cordana pauciseptata* Preuss: from wood of 3, 4 NB [480].
- Coriolellus heteromorphus* (Fr.) Bond. & Sing. (*Trametes heteromorpha* (Fr.) Bres.): brown cubical rot, carie brune cubique: from 2, 3 BC [791]; from 2, 3, 3a, 4 Alta [280]; on 3, 7 Alaska [175, 555], BC [1198]; on 3 NB F53:27; for culture characters, see [791, 943].
- C. serialis* (Fr.) Murr. (*Trametes s. Fr.*): brown cubical rot, carie brune cubique: causes a rot of broad-leaved and coniferous trees; from *P. sp.*, 4 Que, 7 BC [791, 943]; from 2, 3, 3a, 4 Alta [280]; on 3 Sask F52:95; on 3, 4 Que, 7 BC [790]; on 3, 7 BC [1198], Alaska [175]; common on 3 logs, but sporophores uncommon [555]; for culture characters, see [790, 791, 943].
- C. sinuosus* (Fr.) Sarkar (*Peniophora sinuosa* (Fr.) Cke.): on 3 BC [1198].
- C. variiformis* (Pk.) Sarkar (*Trametes v. Pk.*): light brown cubical rot, carie brune cubique: on *P. sp.* NB F53:27; on log of *P. sp.* NS [1138]; on 2, 3, 7 BC [1198]; from 3 BC Ont [791]; on 3, 7 Alaska [175].
- Corticium berkeleyi* Cke.: on wood of *P. sp.* Man [93, p. 75]; this fungus may be *Peniophora aspera* or one close to *Corticium bombycinum* (Schum.) Karst., teste Rogers and Jackson.
- C. bicolor* Pk.: on 3 BC [1198].
- C. fuscostratum* Burt [*Athelia fuscostrata* (Burt) Donk]: on 2 BC [1198].
- C. galactinum* (Fr.) Burt: white stringy rot, carie blanche filandreuse: from 3 BC [1160, 1198], Ont F53:84, NB 51:119; from 3, 4 NB [242]; from 4 Man F51:141, Ont F52:76, [1160], Que F57:30; from 6 Que F55:34; see *Abies*.
- C. geogeneum* Bres. (*C. albostramineum* (Bres.) Overh. [*Hypochnicium g.* (Bres.) John Erikss.]): on *P. sp.* Man [93, p. 75].
- C. laeve* Pers. ex Fr.: white spongy rot, carie blanche spongieuse: from 3 BC F58:103, [1203]; see *Abies*.
- C. macounii* Burt: on 3 BC [1198].
- C. notabile* Jackson: on *P. sp.* Man, on decorticated wood of 4 Ont [494, p. 156].
- C. pelliculare* Karst.: on *P. sp.* Man [93, p. 76]; see *Abies*.
- C. pini-canadensis* (Schw.) Rogers & Jacks. (*Peniophora piceina* Overh.): on ?*P. sp.* Man [93, p. 78].
- C. sulphureum* (Pers. ex Fr.) Fr. (*Hypochnus fumosus* Fr., *Phlebia vaga* Fr.): on 3 Man [93, p. 77]; on 7 Alaska [1038]; see *Abies*.
- Coryne sarcoides* (Jacq. ex Fr.) Tul.: from 3 Alta, one strain so isolated inhibited growth of *Coniophora puteana* and *Polyporus tomentosus* in heartwood of *Picea* [281].
- Crepidotus herbarum* Pk.: on 3 BC [1198].
- Cribraria dictyoides* Cke. & Balf.: on fallen *P. sp.* Man [93, p. 25].
- Cytospora sp.*: cause of canker of *P. sp.* Ont 32:85; on *P. sp.* Alta 55:116.

- Cytospora curreyi* Sacc.: on 2 Alta F61:105.
- C. kunzei* Sacc.: canker, chancre cytosporéen: on stems and branches of 1, 3, 4, 5 Ont F56:57; on 3 Sask F52:95, NB F57:25; on 4 Ont F55:67; on 5 Que F56:38; on 5a NB F54:25.
- Dacrymyces minor* Pk.: on decorticated wood of *P. spp.* NS [1138].
- Dactylium dendroides* Fr.: on *Corticium* sp. on 7 Alaska [1038].
- Dasyscyphus* sp. (immature): on cones of 7 Alaska [1038].
- D. agassizii* (Berk. & Curt.) Sacc.: on *P. sp.* NS [1138]; on 7 BC [1198].
- D. aridus* (Phill.) Sacc.: on fallen branches of *P. sp.* Man [93, p. 39].
- D. ellisianus* (Rehm) Sacc. (*Lachnella ellisiana* (Rehm) Seav.): on 7 BC F54:133, [1198].
- Dermea piceina* Groves: on 3 Ont [370, p. 405].
- Didymium melanospermum* (Pers.) Macbr.: on old *P. sp.* Man [93, p. 26].
- D. nigripes* (Lk.) Fr. var. *xanthopus* (Ditm.) Lister: on duff or *P. sp.* NS [1138].
- "*Echinodontium tinctorium*" Ell. & Ev. (*Fomes tinctorius* Ell. & Ev.): brown stringy rot, carie brune filandreuse: on 3 BC [1198]; from 7 BC [85].
- Flammula alnicola* (Fr.) Kummer (*F. connisans* Fr., sensu Ricken): yellow checked rot, carie jaune craquelée: on *P. sp.* Sask F58:72; from 3 BC [1198], Alta-Man, locally common, F51:141; on 3 Alta F53:132; on 3 Mack, 3a Alta [258].
- Fomes annosus* (Fr.) Karst.: fomes root rot, maladie de rond: on 3 BC [1199]; from 3 BC F57:87; on 7 Alaska [175, 1038], BC [1198]; from 7 BC [85, 791].
- F. nigrolimitatus* (Rom.) Egelund: white pocket rot, carie blanche alvéolaire: from *P. sp.* BC [791], Alaska [175]; on 3 Alaska [175], BC [1198]; from 7 Alaska [791], BC [85]; on 7 Alaska [175, 555], BC [1198]; for culture studies, see [791].
- F. officinalis* (Vill. ex Fr.) Neuman (*F. laricis* Jacq. ex Murr.): brown cubical rot, carie brune cubique: from 7 BC [85, 791]; on 7 BC [1198], Alaska [175]; for culture characters, see [791].
- F. pini* (Brot. ex Fr.) Karst. (*F. pini* var. *abietis* (Karst.) Overh.): red ring rot, carie blanche alvéolaire: on *P. sp.* Alaska [175], Man [93, p. 81]; on 2, 3, 7 BC F53:152, [1198]; from 2, 3 Alta F53:129; on or from 3, 4 Alta-Man F51:140, Yukon F62:122, Sask Man F53:105; from 3, 4 NB NS Nfld, 6 NB F53:20; from 3, 4, 6 Que F53:44, 50; from 3, 4, 6 Que, 7 BC [791]; from 3 Ont F51:133; from 3, 4 NS [242]; from 3, 7 Alaska [555]; from 6 NB NS 50:115; one of the most common fungi causing decay in conifers.
- F. pinicola* (Sw. ex Fr.) Cke.: brown cubical rot, carie brune cubique: on *P. spp.* NB NS PEI [1138]; on 2, 7 BC, 3 Alaska, 4 Que [791]; from 3 BC F52:149; on 3 Liard R., Mack F55:91, Sask Man [93, p. 81]; on 3, 4 Ont F51:133; from 3, 6 NS F51:119; on 3, 7 BC [1198], Alaska [175] and principal cause of decay of 7 [555]; from 3, 4 Ont, 7 BC [740]; from 4 Que F57:30; from 6 NB 50:115; on 7 Alaska [1098].
- F. roseus* (Alb. & Schw. ex Fr.) Karst.: brown cubical rot, carie brune cubique: on *P. spp.* NS PEI [1138]; from 3 Sask F52:95, Ont Que [745]; on 3 Alaska [175, 555], BC [1198]; from 6 NS [242]; for characters in culture, see [754, 791].
- F. subroseus* (Weir) Overh.: brown cubical rot, carie brune cubique: on *P. sp.* NS [1138]; on 2 Alta F59:92; on 3 BC [1198]; from 3 Alta-Man F51:133, Sask Man F52:95; from 4 Ont [791]; from 4, 6 NB F53:24; for characters in culture, see [791]; see *Abies*.
- Ganoderma applanatum* (Pers. ex Wallr.) Pat. (*Fomes applanatus* (Pers. ex Wallr.) Gill.: white mottled rot, carie blanche madrée: from 3 BC [1198]; on 7 Alaska [175, 555], BC [1198]; from 7 BC [85].
- G. oregonense* Murr.: causes a white spongy rot; from 7 BC [85, 1198]; on 7 Alaska [175, 555].
- G. tsugae* Murr.: on *P. sp.* NS [1138].
- Gloeocystidiellum lividocoeruleum* (Karst.) Donk (*Aleurodiscus lividocoeruleus* (Karst.) Lemke): on *P. sp.* Ont [599].
- Grandinia granulosa* Fr.: from 3 BC [1198].
- Helotium citrinum* (Hedw.) Fr.: on 3 BC [1199].
- H. sulphuratum* Phill.: on fallen needles of *P. sp.* Man [93, p. 40].
- Hericium abietis* (Weir ex Hubert) K. Harrison: on 7 BC [1198].
- H. ramosum* (Bull. ex Méral) Letellier: on 3 Alta F62:101.
- Herpotrichia nigra* Hartig: brown felt blight, feutrage brune: on 2 BC [1198]; on 7 BC [50], Alaska [1038].
- Hymenochaete cinnamomea* (Pers. ex Fr.) Bres.: on *P. sp.* BC [1198].
- H. fuliginosa* (Pers.) Bres.: on 3 BC [1198].
- H. tabacina* (Sow. ex Fr.) Lév.: on *P. sp.* NS [1138].
- H. tenuis* Pk.: on decaying *P. sp.* Man [93, p. 77].
- Hypoxylon fragiforme* (Pers. ex Fr.) Kickx (*H. coccineum* Bull. ex Fr.): on 7 Alaska [1038].
- H. ohioense* Ell. & Ev.: on *P. sp.* Alaska [175]; the type collection on *Fraxinus* is *Bolinia tubulina* (Alb. & Schw.) Sacc., fide Miller [728]. These *Hypoxylon* records are very doubtful.
- Hysterium acuminatum* Fr.: on twigs of 3 Man [93, p. 43].
- Lachnellula chrysophthalma* (Pers. ex Karst.) Karst.: on 2 Alta F62:101; on 7 Alaska [175].
- L. microspora* Ell. & Ev.: on bark of *P. sp.* Nfld [979].
- Lentinus kauffmanii* A.H.Sm. in Bier & Nobles: causes a brown pocket rot in 7 BC [85, 86, 1198], Alaska [175]; for characters in culture, see [86, 791].
- Lenzites saepiaria* (Wulf. ex Fr.) Fr.: brown cubical rot, carie brune cubique: on *P. sp.* NB PEI [1138]; on 2, 3, 3a, 4 Alta [280]; from 3, 4 Ont [791]; on 3 BC 53:155, Alta F51:141; from 3 Ont [744]; on 3, 7 Alaska [175, 555], BC [1198]; from 6 NS F51:120; on 7 BC [85]; recorded on 4 BC [1198]; for characters in culture, see [744, 791].
- Lophium mytilinum* (Pers.) Fr.: on bark of old 3 Man [93, p. 43].
- Lophodermium filiforme* Darker: needle cast, rouge: on 3 Alta F58:82, Man F51:143, NB [1138]; on 3 Man, 4 Sask F53:107; on 3, 4 Alaska [175]; on 3 Que Ont type, 4 Ont [236, p. 85]; on 4 Alta F63:104, Sask F53:107; on 6 NB F63:37; on 7 Alaska [555].
- L. piceae* (Fckl.) Höhn.: on 1, 3, 4 Ont Que [236]; on 3 Que F56:38, NS [1138]; on 4 NB F56:27; on 7 BC 44:100, [1198], Alaska [175], causing severe defoliation at times [555].
- L. septatum* (Tehon) Terrier: on 3 Que F63:48.
- Lophophacidium hyperboreum* Lagerb.: on 4 Que [875].
- Melampsorella caryophyllacearum* auct. non Schroet. (*M. cerastii* Wint.): on *P. spp.*; see *Chrysomyxa arctostaphyli*.
- Meliola pinicola* Dearn.: causes a sooty mold of needles of 7 BC F57:87, [1199].
- Merulius ambiguus* Berk.: on 3 BC [1198], Alta F53:132.
- M. aureus* Fr.: on fallen *P. sp.* Man [93, p. 82].

Picea

- Merulius fugax* Fr.: on 3 Alaska [175].
- M. himantoides* Fr.: brown cubical rot, carie brune cubique: from 3 BC [1198], Alta F59:92, Man F51:141, NB [242]; on 4 Que F57:30; see *Abies*.
- Micraspis acicola* Darker: on 4 Ont [238, p. 1390].
- Myxotrichella resinae* (Fr.) Jaap: on 7 Alaska [175].
- Naemataloma capnoides* (Fr.) Karst.: on 3 BC [1198].
- Nectria cucurbitula* Sacc.: on *P. sp.* Man [93, p. 46]; on 3 BC F57:87, [1199].
- Odontia bicolor* (Alb. & Schw. ex Fr.) Quél.: white stringy rot, carie blanche filandreuse: on 3 BC [1198], BC Sask [793], Alta-Man F51:140; on 4 Ont NB [793].
- O. lactea* Karst.: on 3 BC [1198].
- O. sudans* (Fr.) Bres. [*Dacryobolus s.* (Fr.) Fr.]: on 3 BC [1198].
- Ostreola consociata* Darker: on 3 Que [237, p. 1384].
- Paxillus pannoides* Fr.: cause of a brown rot of 7 Alaska [175, 555].
- Pellicularia ansosa* Jacks. & Rogers: on 7 BC [1198].
- P. flavescens* (Bon.) Rogers (*Corticium fenestratum* Overh.): on *P. sp.* Man [93, p. 76]; recorded on 3 BC [1198].
- P. subcoronata* (Höhn. & Litsch.) Rogers (*Corticium subcoronatum* Höhn. & Litsch.): on *P. sp.* Man [93, p. 76], NS [1138]; on 3 BC [1198]; see *Abies*.
- P. vaga* (Berk. & Curt.) Rogers (*Corticium vagum* Berk. & Curt.): on *P. sp.* Man [93, p. 77], NS [1138]; on 3 Alaska [175]; see *Abies*.
- Peniophora byssoides* (Pers. ex Fr.) Bres. (*Coniophora byssoides* (Pers. ex Fr.) Karst.): on wood of *P. sp.* Man [93, p. 75]; on imported seedlings of *P. sp.* 31:87; see *Abies*.
- P. carnosa* Burt: on old board of ?*P. sp.* Man [93].
- P. crassa* Burt ex Pk.: on 3, 7 Alaska [175].
- P. cremea* (Bres.) Sacc. & Syd.: on 3 BC [1198].
- P. dryina* (Berk. & Curt.) Rogers & Jacks. (*P. tabacina* Burt): on 3 Alaska [175]; on 7 BC [85, 1198].
- P. gigantea* (Fr.) Massee: white sap rot, carie blanche de l'aubier: on 3 Alaska [175], BC [1198], Ont NB F51:119, 133; on 4 Ont F51:134; see *Abies*.
- P. gracillima* Ell. & Ev. (*P. glebulosa* Bres.): on *P. sp.* Man [93, p. 78]; on 3 BC [1198]; see *Abies*.
- P. livida* Burt: on fallen *P. sp.* Man [93].
- P. luna* Rom.: cause of a brown rot of 7 BC [85, 1198].
- P. pallidula* (Bres.) Bres. (*P. alutaria* Burt): on *P. sp.* Man [93, p. 77]; on 3 BC [1198]; see *Abies*.
- P. pithya* (Pers.) John Erikss.: from *P. sp.* NS, 3 Ont, 4 NB [793].
- P. pseudo-pini* Weres. & Gibson (*Stereum pini* auct. Am.): from 3 BC [1198]; from 4 Alta [793]; on 3, 4 Alta-Man F51:140.
- P. resinosa* Jacks. & Dearden: on 7 BC, type [499, p. 147; 1198].
- P. separans* Burt: on *P. sp.* Nfld, 3 BC Alta [793]; on 3 BC [1203]; see *Abies*.
- P. septentrionalis* Laurila: red heart rot, carie rouge du cœur: from 2 Alta, 3 BC Alta Sask, 4 Ont Que [793]; on 3 BC [1198]; from 6 NS [243; cf. 280].
- P. subincarnata* (Pk.) Litsch. [*Amylocorticium subincarnatum* (Pk.) Pouzar]: on 3 BC [1198].
- Peridermium boreale* Arth. & Kern (?*Chrysomyxa arctostaphyli*, q.v.): 0 I on 3 Yukon [14].
- Peri-peridium acicola* Darker: on 4 Ont [238, p. 1391].
- Phacidium infestans* Karst.: snow blight, brûlure printanière: on the lower branches of *P. sp.* Que 52:102.
- Phialocephala fusca* W. B. Kendrick: on post of 3, type, Ont [554, p. 1015].
- Phlebia albida* v. Post ex Fr.: on 3 BC [1198].
- Pholiota aurivella* (Batsch ex Fr.) Kummer (*P. adiposa* auct. Am.): brown mottled rot, carie brune madrée: on 3 BC [1198].
- P. squarroso-adiposa* Lange: on *P. sp.* BC [1198].
- Physarum nutans* Pers.: on decayed *P. sp.* Man [93, p. 27].
- Pleurostoma candollei* Tul.: on 1 Que F62:50.
- Pleurotus ostreatus* (Jacq. ex Fr.) Kummer: white spongy rot, carie blanche spongieuse: from 3 BC F58:103, [1203]; on 4 Mack [88].
- P. serotinus* (Schrad. ex Fr.) Kummer: from 3 BC [1198].
- Polyporus abietinus* Dicks. ex Fr.: white pocket rot, carie blanche de l'aubier: on *P. spp.* etc. BC-PEI [668], NS PEI [1138]; on 3 Alta F59:92, Mack F55:91; on 3, 4 Ont F55:62; on 3, 7 Alaska [175, 555], BC [1198]; from 4 Que [791]; from 6 NS [242]; for characters in culture, see [791].
- P. adustus* Willd. ex Fr.: on 3 BC [1198].
- P. alboluteus* Ell. & Ev.: on *P. sp.* Alta F53:133; on 2, 3, 7 BC [1198]; on 3, 7 Alaska [175]; on 7 BC [85].
- P. amorphus* Fr.: on 2, 3 BC [1198].
- P. anceps* Pk.: from *P. sp.* Ont [791]; from 3 Sask F52:95, Man F53:107; on 3 Alaska [175]; for culture studies, see [791].
- P. balsameus* Pk.: brown cubical rot, carie brune cubique: on *P. sp.* NS [1138]; from 3 BC [1198], Alta Ont NB F51:119, 133, 144; on 4 Ont F51:134; from 4 Que [791]; for culture studies, see [791].
- P. berkeleyi* Fr.: on 7 BC [1198].
- P. borealis* Fr.: white mottled rot, carie blanche madrée: on *P. spp.* NB NS [1138]; from *P. sp.* NB, 7 Alaska BC [791]; from 3 NB, 6 NS [242]; on 3, 7 BC [1198]; on 7 Alaska [175, 555]; for culture studies, see [791].
- P. caesius* Schrad. ex Fr.: on 3 BC [1198].
- P. canadensis* Overh.: on *P. sp.*, nr. Ottawa, Ont [812, p. 97].
- P. cutifractus* Murr.: on 7 BC [85, 1198].
- P. elegans* Bull. ex Fr.: on 3 BC [1198].
- P. fibrillosus* Karst.: causes a brown rot: on 3, 7 Alaska [555], BC [1198]; on 7 Alaska [175]; from 7 BC [85, 791]; for characters in culture, see [791].
- P. fragilis* Fr.: on 7 Alaska [1038].
- P. guttulatus* Pk.: causes a brown rot: on 7 BC [1198]; from 7 BC [85, 791]; for culture studies, see [791].
- P. hirtus* Quél.: brown cubical rot, carie brune cubique: on 3 BC [1198].
- P. immitis* Pk.: brown cubical rot, carie brune cubique: on wood of 3 Man [93, p. 83]; from 3 Man F52:95.
- P. lapponicus* Rom.: on 3, 7 BC [1198]; on 7 BC [85].
- P. montanus* (Quél.) Ferry and *P. osseus* Kalchbr.: on 7 BC [85, 1198].
- P. pargamenus* Fr.: causes a white rot: on 3 Alaska [175], common on dry sites [555]. This species does occur rarely on *Picea*, but the similar *P. abietinus* is the common one on conifers.
- P. picipes* Fr.: on 7 Alaska [175], BC [85, 1198].
- P. pubescens* Schum. ex Fr.: from 3 BC [1198].
- P. resinus* Schrad. ex Fr.: brown cubical rot, carie brune cubique: on stump of *P. sp.* NS [1138]; on 3 BC [1198].
- P. schweinitzii* Fr.: brown cubical rot, carie brune cubique: on *P. sp.* NS [1138]; on or near 3 Man

- [93, p. 81]; on 3 BC F56:91; from 3 BC [1203], NB [242]; from 3 Ont, 7 BC [791]; on 7 Alaska [175, 555], BC [1198]; major cause of rot of 7 BC [85]; for culture studies, see [791].
- Polyporus subcartilagineus* Overh.: causes a brown carbonizing rot: on 4 Que [82, p. 91]; for culture studies, see [791].
- P. sulphureus* Bull. ex Fr.: brown cubical rot, carie brune cubique: on 3, 7 BC [1198]; on 7 Alaska [175, 555]; from 7 BC [85, 791]; for culture studies, see [791].
- P. tomentosus* Fr. (*P. circinatus* auct. non Fr.): red butt rot, carie rouge alvéolaire du pied: from *P. sp.*, 4 Que [791]; on 2 BC [1199]; on 3 Alaska [555], BC [1198], Sask F60:80; from 3, 4 Alta-Man F51:140, Alta [281]; on 3, 4 Ont F56:57, from 3, 4 NB, 6 NS [242]; from 4 Que F57:30; for culture studies, see [791].
- P. tomentosus* var. *circinatus* (Fr.) Sartory & Maire (*P. dualis* Pk.): red butt rot, carie rouge alvéolaire du pied: from 2 Alta [280]; from 3 Sask F52:93; from 3, 4 Ont F53:84; from 3 NB, 6 NS F51:119; on 3, 7 BC [1198]; from 7 BC [85].
- P. undosus* Pk.: on 7 BC [85, 1198].
- P. ursinus* Lloyd: on log of 2 Alta F53:132.
- P. versicolor* L. ex Fr.: on 7 Alaska [1038]; a doubtful record.
- P. volvatus* Pk.: causes a white rot of conifers: on 3, 7 BC [1198]; on 3 Man [93, p. 84]; from 3 Que [791]; for culture studies, see [791].
- Poria albidipellucida* Baxt.: from 3 BC [1198]; from 7 BC [85].
- P. candidissima* (Schw.) Cke.: on old 3 Man [93, p. 84]; see *Abies*.
- P. cinerascens* Bres.: on 3 Alaska [175].
- P. crassa* (Karst.) Sacc. (*P. xantha* f. *crassa* (Karst.) Sacc.): on *P. sp.*, 3 Alaska [175].
- P. crustulina* Bres.: on 2, 3 BC [1198]; on 3 Alaska [175, 555]; on 6 NB F53:26.
- P. ferrea* (Pers.) Bourd. & Galz.: on 3 BC [1199].
- P. ferrugineofusca* Karst.: causes a yellow ring rot of conifers; from 3 BC Ont, used in culture studies [791].
- P. ferruginosa* (Schrad. ex Fr.) Karst.: on 3 BC [1198].
- P. lenis* (Karst.) Sacc.: on 3 Alaska [175].
- P. monticola* Murr. (*P. microspora* Overh.): causes a brown cubical rot of coniferous and broad-leaved trees; on and from 7 BC, used in culture studies [790, 791, 1198].
- P. nigrescens* Bres.: on 7 BC [85, 1198].
- P. purpurea* (Fr.) Cke. var. *roseolilacina* Bres.: on 3 Alaska [175].
- P. rixosa* Karst.: on 2 BC [1199]; on 3 BC [1198].
- P. sericeomollis* (Rom.) Egel. (*P. asiatica* (Pilát) Overh.): on 3 BC [1198]; on 7 BC [85, 1198].
- P. sitchensis* Baxt.: on 7 Alaska [175, 555].
- P. subacida* (Pk.) Sacc. (*P. colorea* Overh. & Engel.): white stringy rot, carie blanche filandreuse: from 3, 4 Que, 7 Alaska BC [791]; from 3 NB, 6 NS [242]; on 3, 7 BC [1198]; from 6 Que F56:36, NS F51:120; on 7 Alaska [175], [cf. 85].
- P. subincarnata* (Pk.) Murr.: on *P. sp.* NS [1138]; on 3 BC [1198]; on 7 BC [85, 1198].
- P. tarda* (Bres.) Cke. (*P. semitincta* (Pk.) Cke.): from 3 BC [1198].
- P. taxicola* (Pers.) Cke. (*P. rufa* (Schrad. ex Fr.) Cke.): causes a yellow rot: on 3 BC [1198]; from 3 BC, used in culture studies [791].
- P. vaporaria* (Pers. ex Fr.) Cke.: recorded on 7 BC [1198]; probably not distinct from *Coriolellus sinuosus* (q.v.).
- P. weirii* Murr.: causes a yellow laminate rot: from 2 BC F52:145; on 7 BC [1198].
- P. xantha* (Fr. ex Lind) Cke.: brown cubical rot, carie brune cubique: on *P. sp.*, 3 Alaska [175]; on 3, 7 BC [1198]; on 7 BC [85]; from 3, 7 BC, used in culture studies [791].
- Propolis leonis* (Tul.) Rehm: on twigs, etc., of *P. sp.* NS [1138].
- Pucciniastrum americanum* (Farl.) Arth.: needle rust, rouille des aiguilles: 0 I on 2 BC F62:122; on 3 Man F51:143, F52:95, Ont F54:77, [15, p. 13], NB 44:100; on 3, 5 NS 39:99, [cf. 1138]; the 0 I states of this rust do not seem to have been clearly distinguished from those of *P. arcticum*.
- P. arcticum* Tranz.: 0 I on 3 Alta Ont [15, p. 13].
- Pycnoporus cinnabarinus* (Jacq. ex Fr.) Karst. (*Polyporus c. Jacq. ex Fr.*): on 3 NS F53:26.
- Pythium* sp.: from 2 BC [1198].
- Retinocylus abietis* (Crouan) Groves & Wells: leader dieback, dépérissement de la flèche: on resin of 3 BC Alta Sask Man [383, p. 870]; on 2, 3 BC [1199]; on 3 Mack, 4 Alta F61:105.
- Rhinocladia atrovirens* Nannf.: from 2 BC [1198].
- Rhizosphaeria kalkhoffii* Bubák: needle cast, rouge: on needles of 3 NB F59:34; of 5 Que 40:87.
- Rosellinia aquilina* (Fr.) de Not.: on 7 Alaska [175].
- Sarcotrochila piniperda* (Rehm) Korf: on *P. sp.* Ont [875]; on 3 Ont F63:71.
- Schizophyllum commune* Fr.: on old *P. sp.* NS [1138].
- Schizoxylon sepincola* Pers.: on 3 Man [93, p. 42].
- Sclerophoma pithyophila* (Cda.) Höhn.: on 2 BC [1198].
- Sebacina calcea* (Pers.) Bres.: on fallen branches of *P. sp.* Man [93, p. 74], NS [1138]; on 3 BC [1198], Alaska [175].
- Septobasidium pyriforme* (Hoffm.) Cda.: on 3 NS F53:26.
- Sphaeropsis ellisii* Sacc.: on 3 Ont F59:66.
- Sporonema strobilinum* Desm.: on 7 Alaska [175].
- Stereum abietinum* (Pers. ex Fr.) Fr.: causes a brown cubical rot of conifers; on 3 Alaska [175]; on 7 BC [85, 1198]; from 7 BC, used in culture studies [791].
- S. chailletii* (Pers. ex Fr.) Fr.: white stringy rot, carie blanche filandreuse: on 2 Alta F59:92; on 3, from 7 BC [1198]; from 4 Que F57:30; from 6 NS F51:120; see *Abies*.
- S. purpureum* (Pers. ex Fr.) Fr.: from 3 BC [1198].
- S. sanguinolentum* (Alb. & Schw. ex Fr.) Fr.: red heart rot, carie rouge du sapin: on *P. sp.* Man [93, p. 79], NS [1138]; on 3, 7 Alaska [175, 555], BC [1198]; from 3 BC F52:149, Ont NS F51:119, 133; from 3, 4 NB, 6 NS [267]; from 4 Que [791]; on 3, 4 Alta-Man F51:140; from 6 Que F56:36, NS F51:120; from 7 BC [85; cf. 280]; from 4 injured in an ice storm in 1956, NB F58:25.
- S. sulcatum* Burt in Pk.: on 3 Alaska [175], BC [1198], Alta F51:141; a conidium-bearing species [674], [cf. 280].
- Stilbum glomerulaesporum* Ell. & Ev., nom. nud.: on 7 Alaska [175].
- Tomentella coriaria* (Pk.) Bourd. & Galz. (*Hypochnus coriarius* (Pk.) Burt): on decayed *P. sp.* Man [93, p. 77].
- T. pannosa* (Berk. & Curt.) Bourd. & Galz. (*Hypochnus pannosus* (Berk. & Curt.) Burt): on decayed *P. sp.* Man [93].
- T. rubiginosa* (Bres.) R.Maire (*Hypochnus rubiginosus* Bres.): on old 3 Man [93].

Picea

Tomentella spinifera (Burt) Christiansen (*Hypochmus spongiosus* (Schw.) Burt var. *spiniferus* (Burt) Bourd. & Galz.): on decayed ?*P. sp.* Man [93].

Trametes alaskana Baxt. (*Polyporus serialis* Fr. f. *alaskanus*): on 3, 7 Alaska [175, 555].

T. odorata Fr. (*T. americana* Overh.): on *P. sp.* NB NS [1138]; on 3 Alaska [175]; on 3, 7 BC [1198]; from 3 Ont, used in culture studies [744, 791].

Trechispora brinkmanni (Bres.) Rogers & Jacks.: white stringy rot, carie blanche filandreuse: from 3 BC [1198]; from 3a BC F52:153; see *Abies*.

T. raduloides (Karst.) Rogers: from 3 BC [1203]; from 4 Que [674]; see *Abies*.

Trichosphaeria parasitica Hartig: on 6 Que F56:38.

Trogia crispa Fr.: on 3 BC [1198].

Tryblidiopsis pinastri (Fr.) Karst.: on 3 Ont F62:71, PEI F61:37; on 4 BC F62:122; on 7 BC F52:153, [1198].

Tympanis piceae Groves: on 3 Ont [372, p. 590].

T. piceina Groves: on 3 Que [372, p. 602].

Vararia n. sp. inedit.: on 3 BC [1203].

V. granulosa (Pers. ex Fr.) Laurila: on 2, 3 BC [1198]; on 3 BC [674].

Verticicladiella abietina (Pk.) Hughes: on 2 BC [1198]; from 2 BC, from bark beetle on *P. sp.* Ont [553].

V. brachiata W. B. Kendrick: on 4 NB [553, p. 786].

Wallrothiella arceuthobii (Pk.) Sacc.: on *Arceuthobium americanum* on 3 Alta F54:111, BC [570].

Xeromphalina campanella (Batsch ex Fr.) Kühner & Maire (*Omphalia c.* Batsch ex Fr.): white stringy rot, carie blanche filandreuse: on 2, 3, 3a 4 Alta [280]; on 3 BC [1198], Alta F51:141; from 3 NB F51:119; from 3 NB, 6 NS [242]; from 4 Que, 7 BC [791]; on slash of 3 BC F56:91; for culture studies, see [791].

Xylaria polymorpha (Pers.) Grev.: at base of *P. sp.* NS [1138].

Pinguicula L.

LENTIBULARIACEAE

Small stemless perennial herbs of N. and S. America and Eurasia.

1. *P. villosa* L.; subarctic Alaska, Yukon, Mack, south to BC, Alta, Man, Que and Labr.

2. *P. vulgaris* L.; Greenl, Labr, Nfld, NS and NB to Alta and Alaska; also in Eurasia.

Mycosphaerella tassiana (de Not.) Johans. (*Sphaerella pachyasca* Rostr.): on 2 Greenl [900].

M. tassiana var. *tassiana*: on 2 Labr [52].

Ustilago pinguiculae Rostr.: on 1 Man, 2 var. *macroceras* (Lk.) Herder BC, 2 var. *vulgaris* Ont [957].

Pinus L.

PINACEAE

Evergreen trees of the northern hemisphere; important sources of timber.

1. *P. albicaulis* Engelm., whitebark pine, pin à écorce blanche; in Canada sparingly in the mts. of BC and Alta; of limited value for timber.

2. *P. banksiana* Lamb., Jack pine, cyprès; in Canada from NS to Mack and n. BC. Of in-

creasing importance as a lumber producer, the tree is used extensively for railway ties, poles and in the manufacture of kraft paper.

3. *P. contorta* Dougl., shore pine, cyprès; in Canada along the BC coast. The tree is used for firewood.

4. *P. contorta* Dougl. var. *latifolia* Engelm., lodgepole pine, cyprès; in Canada over most of BC, on the e. Rocky Mts. slope of Alta and in the Cypress Hills of Alta and Sask. A valuable timber tree used for railway ties, mine timbers and poles and also for pulp.

5. *P. flexilis* James, limber pine; in Canada in the mts. of BC and Alta. The tree is used locally to a limited extent for fuel.

6. *P. monticola* Dougl., western white pine, pin blanc de l'Ouest; in Canada in s. BC. The wood is similar to eastern white pine.

7. *P. ponderosa* Laws., ponderosa or yellow pine, pin lourd; in Canada in s. BC. The tree is used in the manufacture of boxes, etc., for the fruit industry and the sapwood is suitable for pattern making.

8. *P. resinosa* Ait., red pine, pin rouge; in Canada from s. Nfld to s.e. Man. Wood is valuable for structural timbers and for poles and piling.

9. *P. rigida* Mill., pitch pine, pin des corbeaux; limited in Canada to the Thousand Is. in the St. Lawrence R.

10. *P. strobus* L., eastern white pine, pin blanc; in Canada from Nfld to s.e. Man. The tree produces the most valuable softwood lumber in the country, but it is much less abundant than formerly. 10a, *P. s.* var. *umbraculifera* Carr.; a dwarf form.

11. *P. sylvestris* L., Scots pine, pin sylvestre; native from Europe to Siberia and naturalized in e. N. America; an important timber tree in Europe.

Other hosts: 12, *P. cembra* L., Swiss stone pine.

13, *P. koraiensis* Sieb. & Zucc., Korean pine.

14, *P. lambertiana* Dougl., sugar pine. 15, *P.*

mugo Turra, mountain pine. 16, *P. muricata*

D. Don, bishop pine. 17, *P. nigra* Arnold,

Austrian pine. 17a, *P. n.* var. *poiretiana*

(Ant.) Aschers. & Graebn., Corsican pine.

18, *P. palustris* Mill., longleaf pine. 19, *P.*

pinaster Ait., cluster pine. 20, *P. radiata* Don,

Monterey pine. 21, *P. taeda* L., loblolly pine.

Aleurodiscus minnsiae Jackson: on 7 BC [496]; see *Abies*.

A. penicillatus Burt: on 3 BC [1198]; on 3, 7, 11 BC [599].

A. pini Jackson [*Lactocorticium p.* (Jacks.) Donk]: on 10 Ont type, Que [496, p. 75].

Alternaria tenuis auct. sensu Wiltshire: from damped-off seedlings of 8 Ont F54:75.

Arceuthobium americanum Nutt. ex Engelm. or *A. sp.*:

- dwarf mistletoe, faux-gui: on 2 Alta-Man 48:98, F51:141, Alta F52:122, Sask 33:63, Sask Man F52:93, map F54:101, Ont F55:67, [cf. 570]; on 4 BC Alta F51:141, 150, F52:124, [570]; on 7 BC [569, 570].
- Arceuthobium campylopodum* Engelm. f. *laricis* (Piper) Gill: dwarf mistletoe, faux-gui: on 3, 6 BC [570]; on 4 BC, 6 Slokan L., BC F53:156, [569].
- Armillaria mellea* (Vahl ex Fr.) Kummer: root rot, pourridié-agaric: on 2 Alta F59:92, Sask F53:107, Que F58:35; on 2, 8, 10 Ont F54:76; heavy on 4 in poor vigor BC F56:90, on naturally generating 4 Alta F53:130; on 5 Alta F62:101; on 6, from 7 BC [1198]; on 10 Ont F51:133, NB F62:37; at base of 11 NS 51:106; on 19, 20 BC F63:125.
- Atropellis pinicola* Zeller & Goodd. (*Godronia zelleri* Seav.): canker, chancre atropellien: on *P. sp.* BC [977]; on 6 BC [1198].
- A. piniphila* (Weir) Lohm. & Cash: canker, chancre atropellien: on 3 BC [1198], Alta F57:71; on 4 BC F52:148, F56:90, Alta Sask F53:132; severe on 4 in the Robb-Coalspur area, Alta F55:90; on 7 BC F57:89, [1199].
- A. tingens* Lohm. & Cash: on 3 BC [1198]; on 10 NS F59:34.
- Aureobasidium pullulans* (de Bary) Arn. (*Pullularia p.* (de Bary) Berk.): from 3 Alta [105]; from 8 NB F53:26; from needles of 15 cult. Man 43:97.
- Biatorrella resinae* (Fr.) Mudd (stat. conid. *Zythia resinae*, q.v.): on 2 Alta F62:101, Ont 34:105, [cf. 35].
- Bifusella linearis* (Pk.) Höhn.: needle cast, rouge: on 5 Alta F62:101; on 6 BC [236]; on 10 NS [1138].
- Caliciopsis pinea* Pk.: canker, chancre caliciopsien: on 10 NB 50:116, F53:23, [cf. 318]; on 6 by artificial inoculation BC F62:121.
- C. pseudotsugae* Fitzp.: on 11 BC F62:121, [318].
- Cenangium abietis* (Pers.) Rehm (*C. ferruginosum* (Fr.) Fr.): twig blight, brûlure des rameaux: on 4 BC F59:109; on 6, 7 BC [1198]; on 7 BC F53:154, 156.
- C. acuum* Cke. & Pk.: on *P. sp.* Que 39:99; on needles of *P. sp.* BC, on 10 Ont [979].
- C. atropurpureum* Cash & Davidson: on 8, 11 Ont F62:69.
- Ceratocystis euophioides* Wright & Cain: on or from 8, 10, 11 Ont [781, p. 1222].
- C. falcata* Wright & Cain: on sapwood of 10 Ont [781, p. 1226].
- C. huntii* Robinson: on 4 attacked by the mountain pine beetle, *Dendroctonus monticolae* Hopk., BC [896, p. 528].
- C. sagmatospora* Wright & Cain: on sapwood of 8, 10 Ont [721, p. 1226].
- Ceratostomella ?sphaerosperma* (Fckl.) Sacc.: on 6 BC [50].
- Cladosporium herbarum* Lk.: from 3 Alta [105]; from damped-off seedlings of 8 Ont F54:75.
- Coccomyces strobili* Reid & Cain (*Coccophacidium pinu* auct. Am. non (Alb. & Schw.) Rehm or *C. crustaceum* (Curt.) Durand nom. nud.): on 10 Ont NB NS [873, p. 1127], Que F61:37, NB F62:37, NS [1138].
- Coleosporium asterum* (Diet.) Syd. (*C. solidaginis* Thüm.): needle rust, rouille des aiguilles: 0 I on 2 Sask Man, 3 Alta [15, p. 43]; on 2 Sask Man [93, p. 63], Ont 33:117; on 2, 8 Ont F52:73, [828], Que 34:75, NB F53:24; on 3 BC [1198]; on 4 Alta F51:143; F51:132, Que 32:105, NB 50:116, NS 53:108; on 11 Ont 52:105, NS F63:37. A collection made on 2 Man 43:97 resembled *Peridermium montanum* Arth. & Kern rather than *P. acicola* Underw.; the record of *C. helianthi* (Schw.) Arth. on 2 Ont F53:75 probably belongs here.
- C. pinicola* (Arth.) Arth.: needle rust, rouille des aiguilles: on 2 Ont [876]; ? on 2 Que [806; cf. 15, p. 46].
- Coniophora betulae* (Schum.) Karst.: on 7 BC [1198].
- C. kalmiae* (Pk.) Burt: on old wood of 2 Man [93, p. 75]; on 10 NB F62:37.
- C. puteana* (Schum. ex Fr.) Karst.: brown cubical rot, carie brune cubique: on fire-killed *P. spp.* Ont F52:71; on or from 2, 8, 10 Ont [55]; from 7 BC F58:113, [1203]; from 10 Ont F53:83, [1161; cf. 607].
- C. suffocata* (Pk.) Masee: on *P. sp.* Man [93, p. 75].
- Conoplea geniculata* (Cda.) Hughes: on 3 Alta, coniferous wood and bark Ont, unidentified wood and bark Ont Nfld [484].
- Coriellus heteromorphus* (Fr.) Bond. & Singer (*Trametes heteromorpha* (Fr.) Bres.): on 2 Alta F53:132; on 6 BC [1198].
- C. serialis* (Fr.) Murr. (*Trametes s. Fr.*): on 10 Que [790].
- C. sinuosus* (Fr.) Sarkar (*Poria sinuosa* (Fr.) Cke.): on 6 BC [1198]; from 8 Ont [55; cf. 943].
- C. variiformis* (Pk.) Sarkar (*Trametes v. Pk.*): causes a light-brown cubical rot: from 2 Que [795]; on 3 Alaska [175]; on 4 Alta F53:32; from 6 BC [791, 1198]; for culture studies, see [791, 795, 943].
- Corticium cebennense* Bourd. [*Amylocorticium c.* (Bourd.) Pouzar]: on 6 BC [1198].
- C. centrifugum* (Lév.) Bres.: on slash of 4 Alta F53:132; see *Abies*.
- C. electum* Jackson: on decorticated wood of *P. sp.* Ont [494, p. 146].
- C. eximum* Jackson: on bark of dead branches of 10 Ont [494, p. 154].
- C. furfuraceum* Bres.: on 6 BC [1198]; on 10 Ont, a conidium-bearing species [674].
- C. fuscostratum* Burt: on *P. sp.* Ont F51:132; from 2 Ont [55]; from 10 Ont [1161]; see *Picea*.
- C. galactinum* (Fr.) Burt: white stringy rot, carie blanche filandreuse: from 2, 8, 10 Ont [55]; from 2 NB-NS F53:22; on 3, 6 BC [1198]; from 8, 10 Ont [1160]; on or from 10 Ont F51:133, F52:75, [607, 1161]; see *Abies*.
- C. laeve* Pers. ex Fr.: from 10 Ont [607]; see *Abies*.
- C. notabile* Jackson: on 2 Man Ont [494, p. 156].
- C. pelliculare* Karst.: on old 2 Man [93, p. 76]; on slash of 4 Alta F53:132; see *Abies*.
- C. reconditum* Jackson: on bark of 10 Ont [494, p. 154].
- C. sulphureum* (Pers. ex Fr.) Fr. (*Hypochnus fumosus* Fr.): on fallen 2 Man [93, p. 77]; on 6 BC [1198]; see *Abies*.
- Coryne sarcoides* (Jacq. ex Fr.) Tul.: from 2 Ont, 4 Alta [281]; on 3 Alta [105].
- Crepidotus ?nidulans* (Pers.) Qué.: on old boards of *P. sp.* Man [93, p. 100].
- Cronartium coleosporioides* Arth.: rust, rouille: In sensu lat.: 0 I on 2 NB F56:26, NS 55:26; on 3 BC 34:75, Alaska [1038]; on 3, 4 Alaska [175]; on 3 Alaska BC, 7 BC [15, p. 29]; on 3, 11 Ont [828].
- As *C. harknessii* Meinecke nom. nud., *Peridermium h. J.P. Moore*, or gall rust, rouille-tumeur: on 2 Alta F53:131, Sask F52:96, Sask Man F53:107, F54:99, Que 34:75, 35:62, F56:38, [853]; on 2 × 4 Alta F60:91; on 3 BC [1198], NB 41:83; on 4 BC Alta F52:124; on 7 BC 23:114, [1198]; on 7, 11 cult. Ont F52:73; on 11 BC F57:85, F58:101; ? on 11 Man 45:103, Que F54:44; on 17 BC F62:122; on

Pinus

- 19, 20 BC F61:125. Aeciospores on 2 Sask failed to infect *Castilleja rhexifolia* and *Melampyrum lineare* [1195].
- As *C. stalactiforme* Arth. & Kern. nom. nud., *Peridermium s.* Arth. & Kern., or stem rust, rouille du tronc: on 2 Sask Man F52:96, Man F51:143; on 3 BC [1198]; on 4 BC Alta F52:124, Alta F53:132. Inoculation with aeciospores resulted in II and III on *Castilleja rhexifolia* and *Melampyrum lineare* [1195].
- Cronartium cerebrum* Hedgc. & Long nom. nud.: gall rust, rouille-tumeur: on 2 BC Alta F52:124, Sask F51:143, NB F54:25; on 4 NB F53:24, F56:26; on 11 NS F54:25. *C. cerebrum* is considered a synonym of *C. quercuum* (q.v.), but the records listed here probably concern the gall rust under *C. coleosporioides*.
- C. comandrae* Pk. (*C. pyriforme* Hedgc. & Long): gall rust, rouille-tumeur: on 2 Alta Sask, 3 Alta, 7 BC [15, p. 28]; on 2 Sask, 7 BC 31:85; on 2 Sask Man F52:95, F53:107, Man [93, p. 63], Ont 33:117, [828], Que 34:75, F53:49, [853], NB F56:26; on 3 BC [1198], BC Alta 34:75; on 4 Alta F52:124, F53:132; on 7 BC 24:51, [1198]; on 11 Man F52:96.
- C. comptoniae* Arth.: rust, rouille: on 2 Sask Man F58:73, Sask F54:99, Man Ont [93, p. 63], Ont F58:58, [828], Ont Que 34:75, Que [853], NB 39:62; on 2, 8a Ont F55:63; on 2, 15 NB, 3 NS [1138]; on 3, 15 NB 50:116; on 3, 7 BC [1198]; on 15 NB 30:81; on seedling 16, 20 cult. BC [737].
- C. quercuum* (Berk.) Miyabe ex Shirai: gall rust, rouille-tumeur: on *P. sp.* Man [93, p. 63]; on 2 Sask Man [93], Man F52:95, Ont 23:114, 33:117, 48:99, F51:132, F53:86, Que 34:74; on 2, 8, 11 Ont [828]; on 2 Alta NB, 11 Ont [15, p. 25].
- C. ribicola* J.C. Fischer: white pine blister rust, rouille vésiculeuse du pin blanc: this introduced rust was first found in N. America at Geneva, N.Y., in 1906 and in Canada in 1914 on *Ribes* at Guelph, Ont [390] and in 1915 on 10 Ont [388]. In Que the dates were 1916 and 1918 respectively, 31:105. The rust then spread rapidly to the rest of Canada. On 1, 6 BC 22:192, [1198]; on 1 Alta F53:132; on 5 Alta F52:124, F58:82; on 6 BC [15, p. 27], Ont 31:84; on 10 Man F58:72, Man Ont [828], Ont NB NS 23:113, Que F58:36, PEI 26:32, Nfld F53:23, 31; on 10 cult. BC 21:26, [1203]; on 10a Ont 31:84; on 12 BC 21:26; on 14 BC F51:125, [cf. 1138].
- C. spp.* (*Peridermium spp.*, Woodgate rust or repeating rusts): on 3, 7, 11 Ont [828]; on 11 BC F56:91, F57:85, Ont 30:81, Que 32:10, F53:49; see *C. coleosporioides*, sensu lat.
- Cucurbitothis pithyophila* (Fr.) Petr.: stem girdle, chancre cucurbitothien: on 6 BC F52:152, [50, 1198].
- Cytospora sp.*: associated frequently with a chocolate brown stain of sapwood of 2, 8 and occasionally of 10 in E. Canada [314].
- C. pini* Desm.: on 10 NS F61:42.
- Dacrymyces stipitatus* Neuh.: on 4 Alta F53:132.
- Dasyscyphus agassizii* (Berk. & Curt.) Sacc.: on 3, 6 BC [1198]; on 6 BC F52:152.
- D. aridus* (Phill.) Sacc.: on 3 BC [1203].
- D. fuscousanguineus* Rehm: on 6 BC F52:152, [1198].
- D. pini* (Brunch) Hahn & Ayers: canker, chancre dasyscyphéen: on living 1 Alta F53:132; on twigs of 2 Man [93, p. 39]; on 6 BC [1198].
- Dermea pinicola* Groves: on 10 Ont [370, p. 403], NS 50:116.
- Ditiotia radicata* Fr.: on needles of *P. sp.* NS [1138].
- Elytroderma deformans* (Weir) Darker: needle cast, rouge: on 2 Alta, 4 BC F55:91; on 2 Ont F62:70; on 2 × 4 Alta F60:91; on 3, 7 BC [1198]; common in 1954 on 7 BC F54:130, F55:103.
- Epicoccum nigrum* Lk. (*E. purpurascens* Ehrenb.): from damped-off seedlings of 8 Ont F54:75.
- Erinellina rhabidospora* (Pat.) Seav.: on 6 BC F52:152, [1198].
- Europhium trinacriiforme* Parker: on dead or dying sapwood and bark of 6 type BC [823, p. 175], [1198]; associated with pole-blight lesions [824].
- Exidia saccharina* Fr.: on slash of 4 Alta F53:132.
- Flammula alnicola* (Fr.) Kummer (*F. conissans* Fr., sensu Ricken): yellow checked rot, carie jaune craquelée: from 3 BC [1198]; on 4 Alta F51:141.
- Fomes annosus* (Fr.) Karst.: fomes root rot, maladie du rond: from roots of 8 and sporophores on stumps Ont F55:61; known from three counties and probably introduced on tree seedlings from Europe 50 years ago [536].
- F. officinalis* (Vill. ex Fr.) Neuman: brown cubical rot, carie brune cubique: from 7 BC [791]; on 7 BC [1198]; for culture studies, see [791].
- F. pini* (Brot. ex Fr.) Karst. (*Trametes p.* Thore ex Fr.): red ring rot, carie blanche alvéolaire: on *P. spp.* BC Man Ont Que [810]; on 1 Alta F63:104; on 2, 8, 10 Ont F51:132, F53:79, [55]; from 2 Que [791]; from 2, 10 NB F53:20; on 3, 6, from 7 BC F53:152, [1198]; on 4 Alta F51:141; from 10 Ont 24:51, [55, 1161].
- F. pinicola* (Sw. ex Fr.) Cke.: brown cubical rot, carie brune cubique: from *P. spp.* Sask Man [93, p. 81], Ont F52:71, NB [1138]; from 2, 8, 10 Ont F55:62, [55, 740]; on 3, 6 BC [1198]; from 7 BC F58:103, on 4 Alta F53:132; from 10 Ont F53:83.
- F. subroseus* (Weir) Overh.: brown cubical rot, carie brune cubique: from fire-killed *P. spp.* Ont F54:73; important cause of sapwood rot Ont [55]; see *Abies*.
- Fusarium spp.*: from damped-off seedlings of 8 Ont: *F. acuminatum* Ell. & Ev., F51:129; *F. episphaeria* (Tode) Snyd. & Hansen, *F. oxysporum* Schlecht., *F. roseum* Lk., *F. tricinctum* Cda., F54:75.
- F. sporotrichioides* Sherb.: associated with cankers on 2 Ont 40:87.
- Ganoderma applanatum* (Pers. ex Wallr.) Pat.: on 11 BC F60:110.
- Gleocystidiellum lividocoeruleum* (Karst.) Donk (*Aleurodiscus lividocoeruleus* (Karst.) Lemke): on *P. sp.* Ont [599].
- Gorgoniceps ontariensis* (Rehm) Höhn.: on needles of 8 Ont [978, 979].
- Helicoma spp.*, etc.: examination of wood of *P. palustris* submerged in seawater at Kodiak, Alaska; Nanaimo, BC; St. Andrews, NB; Liverpool, NS; and Argentia, Nfld; revealed that the deuteromycetes *Helicoma spp.*, *Humicola alopallonella* Meyers & Moore and *Pericauda arcticoccanorum* Moore, and the ascomycetous genera *Lulworthia* Sutherland, *Ceriosporopsis* Linder and *Peritrichospora* Linder were abundant on wood submerged at these northern locations [726].
- Helicogonium jacksonii* L.T.White: on *Corticium microsporum* (Karst.) Boud. on wood of 10 and other conifers Ont [1163, p. 390].
- Hendersonia pinicola* Wehm.: on 3 BC [1198].
- Herpotrichia nigra* Hartig: brown felt blight, feutrage brune: on 3 BC [1198].
- Hypoderma desmazierii* Duby (*H. brachysporum* Rostr., *Lophodermium b.* (Rostr.) Tub.): needle cast, rouge: on 2, 8 Ont, 10 Ont Que NB NS, 11 Que [236]; on 10 Ont 25:66; NB 29:163, F56:26, NB NS [1138].

- Hypoderma pini* (Desm.) Darker: on 5 Alta F63:104.
- Hypodermella ampla* (Davis) Dearn.: needle cast, rouge: on 2 Sask Man [93, p. 43], Sask F52:96, Man 43:97, F53:108, Ont NS [236], Que 34:75, F56:37, NB 50:116, F51:121, NS [1138].
- H. concolor* (Dearn.) Darker: on 2 Sask F52:96; on 2 Ont, 4 Alta Sask [236, p. 59]; on 3 BC [1198]; on 4 BC 49:97, Alta F55:91.
- H. medusa* Dearn.: on 2 Ont F62:70; on 4 Alta F53:132, [cf. 236].
- H. montana* Darker: on 3 BC 48:99, [1198]; on 4 Alta F53:132, [cf. 236, p. 44].
- H. montivaga* (Petr.) Dearn.: on *P. sp.* BC 44:101; on 3 BC [1198]; on 4 Alta F54:109, F56:78, [cf. 236].
- Lachnella hahniana* Seav. [*Trichocyphella h.* (Seav.) Manners]: on slash of 4 Alta F53:132; a *Dasy-scyphus*, sensu lat.
- Lachnellula chrysophthalma* (Pers. ex Karst.) Karst.: on 2 Ont F63:70; on 3 BC [1203]; on 6 BC [1198].
- L. fuscousanguinea* (Rehm) Karst.: on 5 Alta F59:92.
- Lasiosphaeria ovina* (Pers.) Ces. & de Not.: on old wood of 2 Man [93, p. 51].
- Lentinus lepideus* Fr.: brown cubical rot, carie brune cubique: on conifer trees, especially *P. spp.* Man Ont Que [791]; on 6 BC [1198].
- Lenzites saepiaria* (Wulf. ex Fr.) Fr.: brown cubical rot, carie brune cubique: on coniferous or, rarely, broad-leaved trees; from fire-killed *P. spp.* Ont F51:128; from *P. sp.* NS [1138]; from slash of 2, 8, 10, 11 Ont F55:62; from 2, 8, 10 Ont [55]; from 2 Ont, 10 Ont Que [744]; on 3, 6, 7 BC [1198]; on felled 7 BC F57:83; from 10 Ont F58:83, [607], [cf. 791].
- Leptographium sp.*: from blue-stained wood of 6 BC [479, p. 620; 588].
- Leptostroma pinastri* Desm.: on needles of 2 Sask Man [93, p. 133].
- Lophium mytilinellum* Fr.: on 2 Ont F60:67; on bark of conifer Man [93, p. 43].
- L. mytilinum* (Pers.) Fr.: on boards of *P. sp.* and bark of 2 Man [93, p. 43].
- Lophodermium nitens* Darker: needle cast, rouge: on *P. sp.* NB NS 31:85; on 6 BC [1198]; on 10 Ont type, NS [236, p. 74], Que 38:93, NS 40:87, [1198]; on 12 cult. Ont 36:69.
- L. pinastri* (Schr. ex Fr.) Chev. (*L. ?pinicola*, q.v.): needle cast, rouge: on *P. sp.*, 4 Alaska [175]; on 2 Alta F62:102, Mack F63:104, Sask 50:116, Sask Man [93, p. 43], Que F56:37; on 2 Ont Que, 3 BC, 4 Alta, 8 Ont Que, 10 Ont, 11 Que, 17 Ont [236]; on 2, 10 NB F54:25; on 6, 7 BC [1198]; on 7 BC 46:78; on 8 Que 39:99, NB 38:93, NS F52:19; on 10 Ont F57:51, NB 50:116, NS [1138]; on 11 NS F63:37.
- L. pinicola* Tehon: on 3 BC [1198].
- Marasmius androsaceus* Fr.: on fallen needles of *P. sp.* Man [93, p. 91].
- M. campanellus* (Fr.) Atk. & House: on dead twigs of 2 Man [93].
- Melampsora albertensis* Arth.: *P. spp.* were artificially infected resulting in trace to heavy infection on 7, trace to moderate on 4, slight on 11, and trace on 2, 8 [738].
- M. occidentalis* Jackson: *P. spp.* were artificially infected resulting in heavy to very heavy infection on 7 and a trace on 4 [738].
- M. pinitorqua* Rostr. (*M. populnea* (Pers.) Karst.): 0 I reported on young trees of 7 BC [1206], but subsequent studies clearly indicated that the infection was caused by *M. albertensis* (q.v.).
- Merulius ambiguus* Berk.: on slash of 4 Alta F53:132.
- M. aureus* Fr.: on 2 Man [93, p. 82].
- M. fugax* Fr.: on old 2 Man [93]; on 6, 7 BC [1198].
- M. himantoides* Fr.: brown cubical rot, carie brune cubique: from young 2 Que F57:30; from 2, 8 Ont [55]; from 7 BC F58:103, [1203]; from 10 Ont F52:75, NB NS F53:22; see *Abies*.
- M. lacrymans* Wulf. ex Fr.: from 7 BC F58:103, [1203]; see *Abies*.
- M. serpens* Tode ex Fr.: on 7 BC [1198].
- Naemacyclus niveus* (Pers. ex Fr.) Sacc.: on 2, 11 Que [236].
- Nectria sanguinea* (Bolt. ex Fr.) Fr.: on stump of *P. sp.* NS [1138].
- Neopeckia coulteri* (Pk.) Sacc.: on 1 Alta F61:105; on 5 Alta F59:92.
- Odontia bicolor* (Alb. & Schw. ex Fr.) Quél.: white stringy rot, carie blanche filandreuse: from 2 Ont [55]; from 6 BC, 10 Ont [793]; on 10 Ont [1161], NB NS F53:22.
- Oidiodendron tenuissimum* (Pk.) Hughes: from rot of 3 Alta [54].
- Ostreola sessilis* Darker: on terminal buds of 10 Que [237, p. 1386].
- Pachybasium pyramidale* (Bon.) Oud.: ? on charred wood of 2 Man [93, p. 122].
- Paecilomyces varioti* Bainier: from 3 Alta [105].
- Papularia spp.*: *P. arundinis* (Cda.) Fres. and *P. sphaerosperma* (Pers.) Höhn. from damped-off seedlings of 8 Ont F54:75.
- Patinella ?punctiformis* Rehm: on bark of 2 Man [93, p. 41].
- Pellicularia pruinata* (Bres.) Rogers (*Corticium botryoideum* Overh.): on old bark of 2 Man [93, p. 75]; see *Acer*.
- P. vaga* (Berk. & Curt.) Rogers (*Corticium vagum* Berk. & Curt.): on bark of 2 Man [93, p. 76]; see *Abies*.
- Penicillium frequentans* Westling: from damped-off seedlings of 8 Ont F54:75; from 3 Alta [105].
- Peniophora accedens* (Bourd. & Galz.) Wakef. & Pears.: on *P. sp.* Ont [1152]; see *Abies*.
- P. aspera* (Pers.) Sacc.: from 2, 8 Ont [55]; see *Abies*.
- P. byssoides* (Pers. ex Fr.) Bres. (*Coniophora byssoides* (Pers. ex Fr.) Karst.): on dead wood of 2 Man [93, p. 75]; see *Abies*.
- P. cinerea* (Fr.) Cke.: on bark of 2 Man [93, p. 77]; from 2, 10 Ont [55].
- P. compta* Jackson: on decayed coniferous wood, frequently 10 Ont [493, p. 138].
- P. crassa* Burt ex Pk.: on 6 BC [1198].
- P. cremea* (Bres.) Sacc. & Syd.: on 2 Man [93, p. 78].
- P. duplex* Burt (*P. pini* (Schleich. ex Fr.) Boid. ssp. *duplex* (Burt) Weres. & Gibson, fungus T): from 2 Ont [793]; on or from 2 Ont, on 8 Ont [1153, p. 861].
- P. gigantea* (Fr.) Masee: white sap rot, carie blanche de l'aubier: from 2, 8, 10 Ont [55]; on 3, 6, 7 BC [1198]; from 7 BC F57:83; from fire-killed 8 Ont F51:128; on 10 Ont F51:133, F53:83, [607]; see *Abies*.
- P. gracillima* Ell. & Ev. (*P. glebulosa* Bres.): on 2 Man [93, p. 18]; on 7 BC [1198]; see *Abies*.
- P. hastata* Litsch. [*Hyphodontia h.* (Litsch.) John Erikss.]: on 7 BC [1198].
- P. incarnata* (Pers. ex Fr.) Karst.: on 4 Alta F59:92.
- P. luna* Rom.: on 6 BC [1198].
- P. pallidula* (Bres.) Bres.: on 10 NB F62:37; see *Abies*.

Pinus

- Peniophora phlebioides* Jacks. & Dearden: on 2 Ont [55, 795]; from 7 BC F57:83, F58:103, [1203]; on and from 10 Ont [607].
- P. probata* Jackson: on decaying wood of *P. sp.* Ont [493, p. 136].
- P. pseudo-pini* Weres. & Gibson (*Stereum pini*, sensu auct. Am.): from fire-killed *P. spp.* Ont F52:71; from 2 Ont F53:84, Que 53:30; on 2, 8, 11 Ont, 4 Alta [1153, p. 863]; on 3 BC [1198]; on 4 Alta F51:141; on 10 Ont [793]; for culture characters, see [793, 1153].
- P. separens* Burt: on 4 Alta [793]; see *Abies*.
- P. septentrionalis* Laurila: red heart rot, carie rouge du cœur: on 4 Alta [793].
- P. tenuis* (Pat.) Massee: on old 2 Man [93, p. 78]; see *Abies*.
- Peridermium spp.*: see *Cronartium spp.*
- Phacidiopycnis pseudotsugae* (M. Wils.) Hahn (stat. conid. of *Potebniamyces coniferarum* (Hahn) Smerlis [1029]): on 10 Que 57:118.
- Phialocephala fusca* W.B. Kendr.: on worked wood of *P. sp.*, 10 Ont [554].
- Phialophora heteromorpha* (Nannf.) Wang: from railway tie of 2 ? Ont [113, p. 1015].
- Phlebia radiata* Fr. (*P. merismoides* Fr.): from 2, 8 Ont [55]; on 3 BC [1198].
- Phoma acicola* (Lév.) Sacc.: on 12 cult. Ont 34:75.
- P. glomerata* (Cda.) Wr. & Hockl.: from needles of 15 cult. Man 43:97.
- Phomopsis strobis* Sacc.: on 10 NB F63:37.
- Phyllotopsis nidulans* (Pers. ex Fr.) Singer (*Claudopus n. Pers. ex Fr.*): from 2, 8 Ont [55].
- Pleurotus porrigens* (Pers. ex Fr.) Kummer: on stumps, mainly of *P. spp.* NB NS [1138].
- Polyporus abietinus* Dicks. ex Fr.: white sap rot, carie blanche de l'aubier: on *P. sp.*, 10 Que [791]; on *P. sp.* NS [1138]; on 2, 8, 10 Ont [55]; from 2, 6, 8, 10, 11 Ont F55:62; on 3, 6, 7 BC [1198]; from 8, 10 Ont F51:132; common on fire-killed 10 Ont F53:83, [607].
- P. albellus* Pk.: from 8 Ont [55].
- P. amorphus* Fr.: brown stringy rot, carie brune filandreuse: from 2 Que [791]; on 3, 6 BC [1198]; on slash of 4 Alta F53:132; from 10 Ont F53:83.
- P. anceps* Pk.: causes a white pocket rot of coniferous trees: from *P. sp.* Que, 2 Ont [791]; on *P. sp.* NS [1198]; from 2, 8, 10 Ont [55]; from 3 Alta [795]; from 4 Alta F53:132; from 7 BC F57:86, [cf. 607].
- P. balsameus* Pk.: brown cubical rot, carie brune cubique: from 10 Ont F52:75, [1161].
- P. borealis* Fr.: from 8, 10 Ont [55].
- P. dichrous* Fr.: causes a white rot of broad-leaved trees or, rarely, coniferous trees: from 2, 8 Ont [55]; from 4 BC [791]; on 7 BC [1198].
- P. guttulatus* Pk.: from 2 Ont [55].
- P. leucospongia* Cke. & Harkn.: on 1 BC F61:125; on 4 Alta F59:92.
- P. mollis* Pers. ex Fr.: white stringy rot, carie blanche filandreuse: on 6 BC [1198].
- P. resinosis* Schrad. ex Fr.: on *P. sp.*, 10 Ont F51:132; from 2 Que [791]; on 6 BC [1198].
- P. schweinitzii* Fr.: brown cubical rot, carie brune cubique: on *P. spp.* NS [1198]; from *P. sp.* Que, 8, 10, 15 Ont [791]; on 6, from 7 BC [1198]; on 10 NB 50:116; from 10 Ont [1161], NB NS F53:22.
- P. tomentosus* Fr. (*P. circinatus* auct. non Fr.): red butt rot, carie rouge alvéolaire du pied: from 2 Ont F56:57; from 3, 7 BC [1198]; on 4 Alta F51:141.
- P. tomentosus* var. *circinatus* (Fr.) Sartory & Maire (*P. circinatus* Fr. var. *dualis* Pk.): red butt rot, carie rouge alvéolaire du pied: from 2 Ont F53:84; on 3, 6 BC [1198]; from 7 BC F58:103; from 8 Ont F51:128; from 10 Ont F52:75, [1161].
- P. undosus* Pk.: on 6 BC [1198].
- P. volvatus* Pk.: sporophore on dead 2 Alta F53:131; from 8 Ont [55].
- Poria albobrunnea* (Rom.) Baxt.: on 3 BC [1198].
- P. cinerascens* Bres.: on 7 BC [1198].
- P. cocos* (Schw.) Wolf: from 6, 7 BC [1198].
- P. crassa* (Karst.) Sacc. (*P. xantha* f. *crassa* (Karst.) Sacc.): on 3 Alaska [175]; on 6 BC [1198].
- P. lenis* (Karst.) Sacc.: on 7 BC [1198].
- P. monticola* Murr.: causes a brown cubical rot: from building timbers of *P. sp.*, 2, locality unknown [791]; from fire-killed *P. spp.* Ont F52:71; from 2, 8, 10 Ont [55]; from 8 Ont F51:128; from 10 Ont F53:83.
- P. purpurea* (Fr.) Cke.: on 4 cult. Man 48:99.
- P. sericeomollis* (Rom.) Egel. (*P. asiatica* (Pilát) Overh.): brown cubical rot, carie brune cubique: from 10 Ont F52:75, [1161].
- P. subacida* (Pk.) Sacc.: white stringy rot, carie blanche filandreuse: from fire-killed *P. spp.* Ont F54:73; from 2, 8, 10 Ont [55]; on 3 BC [1203]; on 6 BC [1198]; from 8 Ont F51:128; from 10 Ont [607, 1161], NB NS F53:22; on 10 Ont F51:133; on 11 BC F62:122.
- P. subvermispora* Pilát (*P. notata* Overh.): from 2 Ont [55].
- P. taxicola* (Pers.) Cke. (*P. rufa* (Schrad. ex Fr.) Cke.): from 2 Ont [55]; on 2 Alta F59:92.
- P. weirii* Murr.: yellow ring rot, carie jaune annelée: from roots of 3 BC F52:124.
- P. xantha* (Fr. ex Lind) Cke.: on 6 BC [1198].
- Propolis leonis* (Tul.) Rehm on 2 Nfld F53:26.
- P. rhodoleuca* Fr.: on 2, 11 Ont F60:67.
- Pycnoporus cinnabarinus* (Jacq. ex Fr.) Karst. (*Pycnoporus c. Jacq. ex Fr.*): on 10 NS F53:25.
- Pythium debaryanum* Hesse: from seedlings of 2, 19 PEI 48:99; from 8 NB F60:33.
- Radulum orbiculare* Fr.: on *P. sp.* NS [1198].
- Retinocyclus abietis* (Crouan) Groves & Wells: on 3 Alta [105]; on 4 BC F59:109; from 7 BC Alta [383, p. 870].
- Rhizoctonia solani* Kühn: damping-off, fonte des semis: from damped-off seedlings of 8 Ont F51:129, F54:75; from 15 NB F60:33.
- Rosellinia obliquata* (Somm.) Sacc. var. *americana* Ell. & Ev.: on scales of dead cones of 7 BC [50].
- Sebacina* (*Bourdotia*) *pini* Jackson & G.W. Martin [*Basidioidendron p. (Jacks. & G.W. Martin)* Luck-Allen]: on 10 Maple, Ont [673, p. 686].
- Septobasidium pinicola* Snell: on 10 Ont F57:51, F60:67, Que F63:49, NS F53:26.
- Septogloeum gillii* Ell.: on *Arceuthobium americanum* (q.v.) on 4 Alta F53:130, F54:111; on *A. campylopodium* f. *tsugensis* (Rosendahl) Gill [? f. *laricis*, q.v.] on 4 BC F55:106; on *A. americanum* on 2 Alta Sask, 3 BC Alta; on *A. campylopodium* on 3, 7 BC [303].
- Septonema chaetospira* (Grove) Hughes var.: from 3 Alta [105].
- Stemonitis fusca* Roth: on decayed *P. sp.* NS [1138].
- Stereum chailletii* (Pers. ex Fr.) Fr.: white stringy rot, carie blanche filandreuse: on 6 BC [1198]; see *Abies*.

Pisum L.

Soft annual or perennial herbs of the Mediterranean region and w. Asia; one widely grown for food and fodder.

Sterum sanguinolentum (Alb. & Schw. ex Fr.) Fr.: red heart rot, carie rouge du sapin: on 2 after injury by ice storm NB F58:25; on 3, 6, 7 BC [1198]; from 3 Alta F57:73; on 4 Alta 48:99, F51:141; from 7 BC 41:83, [791]; on 8 Ont F51:132, PEI F62:37; on 10 NS 50:116.

Stilbospora pinicola Berk. & Curt.: on 7 BC [1198].

Stypella papillata Möll.: on *P. sp.*, 10 Ont [619].

Thelephora terrestris Ehr. ex Fr.: on wood of 2 Man [93, p. 79]; on seedlings of 8 Ont F53:85; on 11 Man F52:96; on base of living 11 cult. Man 48:99.

Therrya fuckelii (Rehm) Kujala: on 8 Ont [873], Que F61:54.

Tomentella echinospora (Ell.) Bourd. & Galz. (*Hypochnus echinosporus* (Ell.) Burt): on 2 Man [93, p. 77].

T. ferruginosa (Höhn. & Litsch.) Sacc. & Trott. (*Hypochnus canadensis* Burt): on charred 2 Man [93].

T. tristis (Karst.) Höhn. & Litsch. (*Hypochnus umbrinus* (Fr.) Quél., sensu Burt): on charred 2 Man [93].

Trametes odorata Fr. (*T. americana* Overh.): brown cubical rot, carie brune cubique: on 2 BC [791], Man 48:99; from 2 Ont [744, 791]; on 3 BC [1198].

Trechispora brinkmanni (Bres.) Rogers & Jacks.: white stringy rot, carie blanche filandreuse: from 2, 8 Ont [55]; from fallen 10 Ont [607]; see *Abies*.

T. coronifera (Höhn. & Litsch.) Rogers & Jacks. [*Sistotrema coroniferum* (Höhn. & Litsch.) Donk]: from dead 10 Ont [607].

Tremella lutescens Pers.: on 3 BC [1198].

T. mesenterica Fr.: on 4 Alta F53:132.

T. saccharina Fr. var. *foliacea* (Bref.) Bres.: on bark of dead 2 Man Ont [93, p. 74].

Trichoderma viride Pers.: from damped-off seedlings of 8 Ont F54:75.

Tympanis confusa Nyl.: canker, chancre typanien: on *P. sp.* Ont [379]; on 3 Alta F58:82.

T. hypopodia Nyl.: on *P. spp.* Ont [379]; from 3 Alta [105]; on 6 BC F63:125.

T. pithya (Fr.) Karst.: on *P. spp.* Ont Que [379]; ? on 6 BC F53:156.

Valsa kunzei Fr. (*Leucostoma k.* (Fr.) Munk): on 10 NB F62:37.

V. pini (Alb. & Schw.) Fr.: canker, chancre cytosporéen: on 8 Ont F58:59.

Vararia granulosa (Pers. ex Fr.) Laurila: on 7 BC [1198].

Verticicladiella procera W.B. Kendr.: on stump of 2 Que; from heart rot of 10 Ont [553, p. 783].

Wallrothiella arceuthobii (Pk.) Sacc.: on *Arceuthobium americanum* on 2 Alta Man [93, p. 51], Sask F51:143, F52:94, 99, Sask Man F53:106; on 2, 4 Alta F53:130; on 4 BC F55:166, [cf. 570]; for life history of the hyperparasite, see Dowding [262].

Xeromphalina campanella (Batsch ex Fr.) Kühner & Maire (*Omphalia c.* Fr.): white stringy rot, carie blanche filandreuse: from 10 Ont F52:75, [1161], NB NS F53:22.

Zythia resinae (Ehr.) Karst.: on 2 Ont 33:117; on 3 Alta F58:82, [105]; on 3, from 6 BC [1198].

Needle blight: of 10 Ont: appears first in semimature tissues of the needles usually some distance from the tip and is characterized by the orange-red discoloration of the distal portion. The blight seems to occur after one or more days of wet weather followed suddenly by a continuous sunny period [608].

1. *P. sativum* L., garden pea, pois mange-tout; native to Eurasia, widely cult. on a large scale for canning, etc. 1a. *P. s.* var. *arvense* (L.) Poir., field pea, pois à soupe; grown for the dry seeds used in making soup, etc. No distinction is made between the two hosts in the disease records.

Alternaria tenuis auct. sensu Wiltshire: blossom and pod blight, brûlure alternarienne: on 1 Ont [1131]; as *A. sp.* Ont 30:44.

Aphanomyces euteiches Drechsl.: root rot, pourridié: on 1 Ont 48:45, Que 53:63, 54:69; apparently an unimportant pathogen in Ont, 56:64.

Ascochyta pinodella L.K.Jones: foot rot, pourridié ascochytiq: on 1 BC 57:64, Alta 59:50, Ont 54:69, Que 57:64, 58:61.

A. pisi Lib. (*Mycosphaerella pinodes* auct.): leaf and pod spot, ascochytose: on 1 Alaska [175], BC-Nfld 24:37, 25:48, 58:61, [cf. 1138]; probably the most important seed-borne disease in the large-scale production of peas in Canada. The disease occurs in every province, but it is particularly destructive in E. Canada, especially Ont and Que. It is most severe in areas of high rainfall and is least prevalent in the dry areas of s. Alta and the BC interior. Although most reports of serious losses in the field were attributed to *Mycosphaerella pinodes* (q.v.), seed examination revealed that *A. pisi* was the predominant species affecting the seed [1010].

Soaking diseased pea seed in a solution of antibiotic XG controlled infection of the seedlings by *A. pisi* and caused no serious impairment of seed germination [1128]. Cycloheximide (Acti-dione) also controlled infection but seriously reduced germination [1130].

Four distinct physiologic races of *A. pisi*, more or less sharply delimited geographically, were found in Canada [1125]. In a cross between Ottawa A-100, a pea strain resistant to race II of *A. pisi*, and the susceptible cultivar Thomas Laxton, resistance was dominant in the F_1 and segregation for resistance occurred in a 15:1 ratio in the F_2 population [625].

Botrytis cinerea Pers.: gray mold, moisissure grise: on leaves and pods of 1 Alaska [175], BC [535], Sask Man [93, p. 132], Que 42:49, NB 61:72, NS 41:28.

Cladosporium cladosporioides (Fres.) De Vries f. sp. *pisicola* (Snyd.) De Vries (*C. p.* Snyd.): leaf spot, tache cladosporienne: on 1 BC 36:28, PEI 42:49, [1138].

C. herbarum Lk.: on 1 Alaska [175].

Colletotrichum pisi Pat. [*C. gloeosporioides* Penz.]: anthracnose, anthracnose: on leaves and pods of 1 Man 23:81, [93, p. 129], Ont 45:59; apparently secondary to mycosphaerella blight Ont 54:69.

Erysiphe polygoni DC. ex Mérat: powdery mildew, blanc: on 1 BC-PEI 24:38, 29:31, 47:54, [cf. 50; 93, p. 44; 535; 1138]; although the disease is widespread, it rarely causes damage.

Fungi from seed: *Acremoniella atra* (Cda.) Sacc., Ont [374]. *A. verrucosa* Togn., Ont [382]. *Alternaria consortialis* (Thüm.) Groves & Hughes, BC Alta; *A. tenuis*, Sask Ont Que; *Ascochyta pinodella*, BC Ont Que; *A. pisi*, Alta Man Ont England; *Ascodesmis echinulata* Bainier, *Aspergillus amstelodami*

- (Mangin) Thom & Raper, Ont; *A. flavus* Lk., Ont Que; *A. ochraceus* Wilhelm, *A. repens* (Cda.) de Bary, *A. ruber* (Brem.) Thom & Raper, Ont; *A. ustus* (Bainier) Thom & Church, Ont Sask; *Aureobasidium pullulans* (de Bary) Arn., BC; *Bipolaris sorokiniana* (Sacc. in Sorok.) Shoem., Ont; *Botrytis cinerea*, Sask; *B. crystallina* (Bon.) Sacc., Ont Que; *Cephalosporium acremonium* Cda., Ont [374]. *Chaetomium bostrychodes* Zopf, Man Que; *C. cochliodes* Pall., BC Sask Ont [1009]. *C. dolichotrichum* Ames, Sask Ont; *C. elatum* Kze. & Schm., BC; *C. funicola* Cke., Alta Ont [1008]. *C. globosum* Kze., BC Ont Mich [1009]. *C. indicum* Cda., BC Ont Que [1008]. *C. murorum* Cda., Alta Ont [1009]. *C. reflexum* Skolko & Groves, Man Ont [1008]. *C. succineum* Ames, Alta [1009]. *Chlamydomyces palmarum* (Cke.) Mason, Ont [382]. *Cladosporium cladosporioides*, BC; *C. cladosporioides* f. sp. *pisicola* BC Sask; *C. herbarum*, BC Alta Sask Man Ont; *C. malorum* Ruehle, Alta Sask; *Colletotrichum pisi*, Cunninghamella echinulata Thaxt., *C. elegans* Lendner, *Curvularia geniculata* (Tracy & Earle) Boed., *C. inaequalis* (Shear) Boed., *C. lunata* (Wakker) Boed., Ont [374]. *C. trifolii* (Kauffm.) Boed., Ont [381]. *Epicoccum neglectum* Desm., *E. nigrum* Lk., Ont [374]. *Fusarium acuminatum* Ell. & Ev., Alta Ont; *F. avenaceum* (Fr.) Sacc., Ont Que; *F. culmorum* (W.G.Sm.) Sacc., BC; *F. equiseti* (Cda.) Sacc., Alta Ont; *F. graminearum* Schwabe, *F. moniliforme* Sheldon, Ont; *F. oxysporum* Schlecht., BC Sask Ont; *F. poae* (Pk.) Wr., Ont Que; *F. semitectum* Berk. & Rav., Que; *F. sporotrichioides* Sherb., Ont [334]. *Gonatobotrys simplex* Cda., Ont Que; *Lichtheimia corymbifera* Vuill., Que; *L. ucrainica* Naum., Ont; *Melanospora papillata* Hotson, Ont Sask; *M. zamiae* Cda., Ont; *Memnoniella echinulata* (Rivolta) Gall., Ont; *Microascus variabilis* Massee & Salm., Ont Que; *Mucor plumbeus* Bon., Alta; *M. plumbeus* var. *spinescens* Lendner, *M. racemosus* Fres., *M. sphaerosporus* Hagm., Ont; *Mycosphaerella pinodes* (Berk. & Blox.) Vesterg., Alta Sask Man Ont Que; *Myrothecium verrucaria* (Alb. & Schw.) Ditm., Ont; *Nigrospora oryzae* (Berk. & Br.) Petch, Man; *Oospora lactis* Fres., *Paecilomyces varioti* Bain., Ont; *Papularia arundinis* (Cda.) Fr., Ont Que England; *P. sphaerosperma* (Pers.) Höhn., Alta; *Pellicularia filamentosa* (Pat.) Rogers, *Penicillium cyclopium* Westling, Ont; *P. kapuscinskii* Zaleski, BC; *P. terrestre* Jensen, *P. verrucosum* Dierckx, *Periconia circinata* (Mangin) Sacc., Ont; *P. pycnosporea* Fres., *Petriella asymmetrica* Curzi, Sask; *Rhizopus cohnii* Berl. & de Toni, Ont; *Sclerotinia sclerotiorum* (Lib.) de Bary, Sask; *Septoria pisi* West., *Sordaria fimicola* (Rob.) Ces. & de Not., *S. inaequalis* Cain, Ont; *Stachybotrys chartarum* (Ehr.) Hughes, Sask; *Stemphylium botryosum* Wallr., Ont Que; *Syncephalastrum fuliginosum* Bainier, *Theilavia basicola* Zopf, *T. sepeidonicum* Emmons, *Tieghemella italica* (Per. & Cost.) Naum., Ont; *Trichocladium asperum* (Cda.) Harz, BC Sask; *Trichoderma viride* Pers., Alta; *Trichothecium roseum* (Pers.) Lk., Ont; *Verticillium albo-atrum* Reinke & Berth., Ont [374].
- Fusarium* spp.: fusarium wilt, flétrissure fusarienne: reported on 1 BC 25:49, 48:47, Alta 39:44, Man 33:28, Ont 23:81. *F. oxysporum* Schlecht. isolated from wilted plants of 1 Sask Man NS [335]. The organism may well be *F. o. f. pisi* (Linford) Snyder & Hansen.
- F. oxysporum* f. *pisii* race 2: near wilt, flétrissure fusarienne: on 1 Ont 57:64, 58:61.
- Fusarium* spp.: fusarium root rot, pourridié fusarien: reported on 1 BC 31:42, Alta Ont 30:43, Sask Man 34:37, Ont 24:37, Que 29:31, NB 36:28, NS 39:44, Nfld 52:53; cause of important losses in Ont, 22:57, 56:64. *F. solani* (Mart.) App. & Wr. f. *pisii* (F.R. Jones) Snyder & Hansen isolated from 1 Man Ont; other species were *F. acuminatum*, Man; *F. avenaceum*, Man Ont; *F. culmorum*, *F. equiseti*, *F. oxysporum* var. *redolens* (Wr.) Gordon, Man Ont [335]. *F. solani* appears to be the most important cause of root rot in canning peas in the latter part of the growing season, especially in a warm year, and may result in complete loss of crop Ont 56:64. The reports too often are based on symptoms only partially confirmed by further study.
- Heterodera goettingiana* Liebscher: pea cyst nematode, nématode du pois: on 1 BC 50:61.
- Mycosphaerella pinodes* (Berk. & Blox.) Vesterg. (*Didymella p.* (Berk. & Blox.) Petr. [208, p. 387]; stat. conid. *Ascochyta p.* L.K. Jones): mycosphaerella blight, brûlure ascochytiq: on 1 BC Ont 43:55, BC [50, 535], Sask 45:57, Man 42:40, Que 34:37, NS 55:67, [1138]; rather prevalent in some seasons in Sask Man.
- Peronospora viciae* (Berk.) Casp. (*P. pisi* Syd. ex Gäum.): downy mildew, mildiou: on 1 BC 30:44, Alta 33:28, Man 48:47, Ont 47:55, Que 32:41, NS 46:42, PEI 42:42, [1138]; occasionally infection is heavy Ont 50:61.
- Pleospora herbarum* (Fr.) Rabh. var. *h.* (*P. armeriae* (Cda.) Ces. & de Not.; stat. conid. *Stemphylium botryosum*, q.v.): on 1 BC [50].
- Pseudomonas pisi* Sackett: bacterial blight, brûlure bactérienne: on 1 BC-Que 24:38, 32:43, 34:38, 43:56, 44:51, Man [93, p. 28]. The disease varies widely in severity, but in some instances the crop was abandoned due apparently to severe outbreaks, 49:51.
- A strain-specific and a polyvirulent phage of *P. pisi* were isolated from peas. The latter also lysed strains of *P. glycinea*, *P. lachrymans* and *P. phaseolicola*. The phage was also used successfully in detecting *P. pisi* in pea seed and plant tissue from infected fields [1066].
- Pythium* spp.: damping-off and root rot, fonte des semis et pourridié pythien: on 1 Alta 42:50, Sask 30:44, Ont 56:64, Que 35:31, NB 29:31; *P. ultimum* Trow was the major cause of root rot in the early part of the season in canning crops in Ont, 56:64.
- Rhizoctonia solani* Kühn: root rot, rhizoctone commun: on 1 BC 44:51, 55:68, [535], Alta 26:25, Man 40:39, Ont Que 56:64, 65, PEI 38:37. Although usually associated with *Pythium* or *Fusarium* in root rot of peas, *R. solani* appeared to be the predominant isolate in BC, 55:68, and Alta, 49:51.
- Sclerotinia sclerotiorum* (Lib.) de Bary: sclerotinia rot, pourriture sclérotique: on 1 Ont 61:365, and cause of severe pod blight NS 54:70.
- Septoria flagellifera* Ell. & Ev.: leaf spot, tache septori- enne: on 1 Sask Man [93, p. 138], Ont 40:39; rarely observed.
- S. pisi* West.: leaf blotch, tache septorienne: on 1 Alta, Ont-PEI 24:37, Sask Man [93, p. 139], Que 36:27, NS 41:39, NS PEI [1138]; frequently reported but severe infections are rare.
- Stemphylium botryosum* Wallr.: leaf spot, tache stem- phylienne: frequently associated with downy mildew BC 48:47, [535].
- Uromyces fabae* (Grev.) de Bary: rust, rouille: 0 I II III on 1 BC 41:39, [535], Sask Man [93, p. 72], Man [15, p. 243], Ont 34:37, Que 25:49, NB 30:44, NS 37:30, PEI 34:37, [cf. 1138]; three strains of *U. fabae* on 1 were distinguished by their reaction on *Vicia*, 37:30.

- ?Clover phyllody virus: phyllody, phyllodie: on 1 Que 58:62.
- Clover vein mosaic virus: stunt, rabougrissement viral: on 1 Man 57:65, Ont 58:60.
- Clover yellow mosaic virus: according to Pratt [860], 1 is susceptible to CYMV and he would equate pea mottle virus with it and not with white clover mosaic virus as done by Smith [1032].
- Pea enation mosaic virus (pisum virus 1): enation mosaic, mosaïque verruqueuse: on 1 Ont 56:65, NB 47:56, 50:62.
- Pea mosaic virus (pisum virus 2): common mosaic, mosaïque commune: on 1 BC 40:39, Alta 34:37, Mack 62:56, Sask 41:39, Ont Que 24:38, NB 28:65, 42:50, NS 30:44, PEI 26:25; occasionally severe Ont 60:98.
- Pea streak virus: pea streak, bigarrure: on 1 Ont 49:52, NS 62:36; occasionally severe Ont 56:65. As pointed out by Walker [1120], the virus diseases of pea need further study.
- Chemical injury: from seasonal carryover of Avadex Man 62:57.
- ?Boron deficiency, carence de bore: dieback, dépérissement: on 1 BC 43:56.
- Manganese deficiency, carence de manganèse: marsh spot, nécrose interne: on 1 Sask 48:48, Man 58:62, Que 44:51.

Plagiobothrys Fisch. & Mey.

BORAGINACEAE

Low mostly annual herbs of w. N. America.

1. *P. hirtus* I.M.Johnson; Oregon.

Synchytrium myosotidis Kühn.: on 1 BC [540, 541].

Plantago L.

PLANTAGINACEAE

Mostly stemless herbs, nearly cosmopolitan.

1. *P. eriopoda* Torr.; in Canada in Que to Man, Mack and Yukon.
2. *P. juncooides* Lam. (*P. maritima* auct. non L.), goose tongue, passe-pierre; Pacific N. America and Patagonia. 2a, *P. j.* var. *decipiens* (Barnéoud) Fern. (*P. d.* Barnéoud); Greenl to Labr and Que and in n. Europe. 2b, *P. j.* var. *glauca* (Hornem.) Fern. (*P. borealis* Lange); Greenl to Hudson Bay.
3. *P. lanceolata* L., English plantain, herbe à cinq coutures; naturalized from Europe; in Canada mainly in s. BC and Ont eastward.
4. *P. macrocarpa* Cham. & Sch.; Alaska to Wash.
5. *P. major* L., plantain, queue de rat ou grand plantain; common in settled districts of all provinces of Canada.
6. *P. oliganthos* Roem. & Sch. var. *fallax* Fern.; Labr and Nfld to Que.

7. *P. rugelii* Dcne., pale plantain, plantain de Rugel; in Canada in s. Ont and s. Que.

Ceratobasidium anceps (Bres. & Syd.) Jackson: on 5 Ont [495].

Erysiphe cichoracearum DC. ex Mérat: on 2 BC 33:118, [535]; on 2a, 6 NS [956]; on 2a NS, 5 NB NS PEI [1138]; on 5 BC [50], Man Ont [93, p. 44], NB 30:98; on 5, 7 Que 31:122.

Leptosphaeria sp.: on 2 Alaska [1038].

Meloidogyne sp. (*Caconema radiculicola* (Greef) Cobb): root-knot nematode, nodosité des racines: on 3, 5 in greenhouse BC 32:110.

Mycosphaerella tassiana (de Not.) Johans.: (*Sphaerella pachyasca* Rostr.): on 2b Greenl [899].

M. tassiana var. *arthopyrenioides* (Auersw.) Barr: on 5 Que [53].

Peronospora alta Fckl.: on *P.* sp. Alaska [175]; on 5 BC [535], Man Ont [93, p. 30], NS [1138].

Phyllosticta plantaginicola Tehon & Daniels: on 5 Man, common [93, p. 136].

P. plantaginis Sacc.: on 4 Alaska [175]; ? on 5 Man [93].

Pleospora penicillus (Schm.) Fckl. var. *p.* (*Pyrenophora chrysospora* (Niessl) Sacc.): on 2 Labr [604].

Puccinia aristidae Tracy (*P. subnitens* Diet.): 0 I on 1 Alta Sask Man [93, p. 66], Sask [15, p. 159], Man 33:118.

Ramularia sp.: on 5 Alaska [175].

R. plantaginis Pk.: on *P.* sp. Alaska [175].

Selenophoma drabae (Fckl.) Petr. (*Septoria semilunaris* Johans.): on 2b Greenl [899].

Septoria plantaginea Pass. var. *plantaginis-majoris* Sacc.: on 5 Man [93, p. 139].

Uromyces peckianus Farl.: 0 I on 1 Alta [15, p. 160].

Aster yellows virus: aster yellows, jaunisse de l'aster: on 5 Ont 30:86, NB 31:122.

Platanus L.

PLATANACEAE

Large trees of s.e. Europe, India and N. and Central America.

1. × *P. acerifolia* Willd., London plane tree, platane; commonly planted in N. America; little damaged by anthracnose.
2. *P. occidentalis* L., sycamore or buttonwood, platane; in Canada native to s. Ont. The tree is not of economic importance; infrequently planted on account of its marked susceptibility to anthracnose.
3. *P. orientalis* L., oriental plane, platane d'Orient; native to s.e. Europe and w. Asia; rarely planted.

Diaporthe prominens (Howe) Ell. & Ev.: on 2 Ont F63:69.

Gnomonia veneta (Sacc. & Speg.) Kleb. (stat. conid. *Gloeosporium nervisequum* (Fckl.) Sacc. [*Discula quercina* (West.) Arx]): anthracnose, anthracnose: on 1, 2 Ont 51:106; on 2 BC 34:78, [50], BC Ont 42:94, Ont 25:63; on 3 BC 59:83. The fungus causes not only a leaf spot but also numerous cankers on twigs.

Hendersonia desmazieri Mont.: on 2 Ont F59:66.

Pleuropogon R.Br.

GRAMINEAE

Soft annual or perennial grasses.

1. *P. sabinei* R.Br.; arctic Canada and Greenl; also Eurasia.

Ascochyta sorghi Sacc. (*A. graminicola* Sacc.): on 1 Frank [604].

Leptosphaeria eustoma (Fckl.) Sacc.: on 1 Frank [52].
L. vagans Karst.: on 1 Greenl [602].

Mycosphaerella tassiana (de Not.) Johans.: on 1 Greenl [602, 603].

M. tassiana var. *tassiana*: on 1 Frank [52].

Physoderma affin. *graminis* (Büsgen) de Wild.: on 1 Frank Keew [971].

Sphaerulina pleuropogonis Rostr.: on 1 Frank [903, p. 7].

Ustilentyloma pleuropogonis Savile: on 1 Frank Greenl [971, p. 708].

Poa L.

GRAMINEAE

Annual or perennial grasses of cool and temperate regions.

1. *P. abbreviata* R.Br.; Alaska and Yukon to Greenl; also in Eurasia.
2. *P. alpigena* (Fr.) Lindm.; Greenl, Labr and Nfld to the Yukon; also in Eurasia. Although there are no records on this host, some of those on 21 may belong here.
3. *P. alpina* L.; Nfld, Que, Ont and Alta; also in Eurasia.
4. *P. ampla* Merr.; Sask and Alta to Yukon in Canada.
5. *P. annua* L., annual bluegrass, gazon; Nfld to Alaska and south; naturalized from Eurasia.
6. *P. arctica* R.Br. (*P. cenisia* auct.); arctic N. America.
7. *P. arida* Vasey; the Great Plains of the U.S. into Alta.
8. *P. canbyi* (Scribn.) Piper; in Canada from Que to Yukon, Alta and BC.
9. *P. compressa* L., Canada bluegrass, gazon bleu; Nfld to Alaska and south; naturalized from Eurasia.
10. *P. cusickii* Vasey; in Canada in BC and Alta.
11. *P. eminens* J.S.Presl; Labr, Nfld and Que to Alaska and n.e. Asia.
12. *P. flexuosa* Sm., eastern arctic Canada and w. Greenl.
13. *P. glauca* Vahl, Greenl to Alaska south to Nfld, Que, Ont and Alta; also in Eurasia.
14. *P. glaucifolia* Scribn. & Will.; BC and Alta to Man in Canada.
15. *P. gracillima* Vasey; Alaska to Alta, Colo and Calif.

16. *P. interior* Rydb.; in Canada from Que to BC.
17. *P. nemoralis* L.; Greenl, Labr, Nfld and NS to Alaska.
18. *P. nevadensis* Vasey; Yukon in Canada.
19. *P. palustris* L. (*P. crocata* Michx., *P. triflora* Gilib.); Nfld to Alaska and south.
20. *P. paucispicula* Scribn. & Merr.; Alaska to Wash.
21. *P. pratensis* L., Kentucky bluegrass, foin à vaches; Labr to Alaska and south; also in Eurasia.
22. *P. secunda* Presl (*P. sandbergii* Vasey); Sask and Alta to Yukon in Canada.
23. *P. stenantha* Trin.; Alaska, Alta, BC to Wash, Mont and Colo.
24. *P. trivialis* L., bird grass, gazon d'Angleterre; Nfld to Ont and s. Alaska; naturalized from Europe.

Other hosts: 25, *P. epilis* Scribn. 26, *P. evagens* Simmons. 27, *P. filipes* Lange. 28, *P. hartzii* Gand. 29, *P. hispidula* Vasey. 30, *P. irrigata* Lindm. 31, *P. laxiflora* Buckl. 32, *P. leptocoma* Trin.

Actinothyrium graminis Kze.: on *P. sp.* Greenl [901].

Allophylaria pusiola (Karst.) Nannf. (*Crumenula p.* Karst.): on 6 Alaska Frank [962], Greenl [603]; on 6 Frank, 13 Nfld [604].

Ascochyta sorghi Sacc. (*A. graminicola* Sacc.): on 21 Alaska [175]; on 21, 23, 24 Alaska [1037]; on 23 Alaska [1038]; on 32 Alaska [1042].

Low-temperature basidiomycete, basidiomycète frigophile: snow mold, pourridié hivernal: on 5, 21 Alta, ?21 Man, 56:47, Sask 57:50; from 21 Alaska [592], Alta [215]. Under controlled conditions, the fungus caused 50% infection and moderate damage to 21 Alta [218]; under natural conditions 21 appears to be moderately resistant to attack [217].

Botrytis cinerea Pers.: on *P. sp.* Alaska [175]; on 5, 21 Alaska [1037].

Cercospora poagena Sprague: on 21 Alaska [1037].

Cladosporium graminum Cda.: on 1, 13 Greenl [601]; on 6, 13 Greenl [602]; on 21 Greenl [900, 902].

C. herbarum Lk.: on 23 Alaska [1038].

Claviceps purpurea (Fr.) Tul.: ergot, ergot: on 8, 14 cult. Man 43:39; on 11 Que 34:106, [8]; on 16 Alta 24:50; on 21 Alaska [1042], Alta 30:98, 53:52, Man [93, p. 45], PEI 26:10, [1138], [cf. 1034]; on 21 Alta; ergot from rye infected 4, 8, 9, 10, 16, 21, 21 Merion [172].

Colletotrichum graminicola (Ces.) G.W.Wils.: anthracnose, anthracnose: on 21 Man [93, p. 129], Que 40:27, [1034]; on 23 Alaska [1037, 1038, 1040].

Coniothyrium helicoideum Sacc.: on 13 Greenl [901].

Cylindrocarpon ehrenbergii Wr.: on 3 Alaska [983, 1037, 1038].

Darluca flum (Biv.-Bern.) Cast.: on *P. poae-nemoralis* (q.v.) on 3, 23 Alaska [1038]; on 3, 21, 23 Alaska [1037]; on 8 Yukon [1042]; on 13 Que [604].

Diplodina arctica Lind: on 6 Frank [604]; on 13 Greenl [602].

D. graminis Sacc.: on 6 Frank [604].

- Drechslera poae* (Baudys) Shoem. (*D. vagans* (Drechs.) Shoem., *Helminthosporium* v. Drechs.): leaf blotch, tache drechsleréenne: on 9 Alaska, 21 Alaska Sask [1993]; on 9, 21, 23 Alaska [1037]; on 13 Yukon [1042]; on 21 Alaska [175], BC 37:20, [535], BC Alta [1034], Alta 34:26, Sask Que 58:46, NB 60:84.
- Entyloma dactylidis* (Pass.) Cif. (*E. irregulare* Johans.): leaf smut, charbon des feuilles: on 5 Alaska [1037, 1038]; on 21 PEI 26:10, [1138; cf. 292]; the PEI record is very doubtful.
- Epicoccum nigrum* Lk.: on 21 NB 60:85.
- Erysiphe graminis* DC. ex Méral: powdery mildew, blanc: on *P. sp.* BC [50]; on 4, 21 Alta 53:52; on 6 Greenl [601]; on 6, 13 Frank [971]; on 9 Sask Man, 17, 19, 21 Man [93, p. 44]; on 9, 21 Alaska [1038]; on 9, 21, 23 Alaska [1037]; on 12 Greenl [900]; on 13, 19 Alaska, 21 Yukon [1042]; on 14 Man [1034]; on 19 Man 43:39; on 21 Alaska [175], BC 43:39, [535], Alta 28:32, Sask 58:46, Ont 35:22, NB 60:84, PEI 26:10, [1138], Nfld 62:45, Greenl [902].
- Fungi from seed: of 9: *Alternaria tenuis* auct. sensu Wiltshire, *Chaetomium globosum* Kze., *Epicoccum neglectum* Desm., *Nigrospora sphaerica* (Sacc.) Mason, *Papularia arundinis* (Cda.) Fr., Ont; of 21: *Alternaria tenuis*, *Chaetomium globosum*, *Trichothecium roseum* (Pers.) Lk., Ont [374].
- Fusarium acuminatum* Ell. & Ev.: from decayed roots of 19, from snow patches on 21 Man [335]; on 21 Alaska [1037]; *F. acuminatum*, *F. avenaceum* (Fr.) Sacc., *Tilletia* sp. on *Puccinia poae-nemoralis* on 21 Alaska [1042].
- F. avenaceum* (Fr.) Sacc.: on 1 Alaska [1037]; on 19 Alaska [1042].
- F. nivale* (Fr.) Ces.: on 1, 9, 21, 23 Alaska [1037]; on 3 Alaska [1038]; on 9 Alaska [1042].
- F. poae* (Pk.) Wr.: associated with silver top of 21 BC 61:60.
- Guignardia graminis* (Lind) Barr (*Ascospora g.* Lind): on *P. sp.* BC [50]; on 1, 13 Greenl [601, p. 152].
- Helotium stipae* (Fckl.) Cash (*Phialea s.* (Fckl.) Rehm): on 3, 9, 24 Alaska [176, p. 45]; on 3, 9 Alaska [1038].
- Hendersonia arundinacea* (Desm.) Sacc.: on 1 Greenl [601]; on 6 Greenl [602]; on 13, 21 Frank [604].
- H. crastophila* Sacc.: on 5, 25 Alaska [1037].
- H. culmicola* Sacc.: on 19 Alaska [1037]; on 32 Alaska [1042].
- H. poae* Rostr.: on 3 Greenl [902, p. 120].
- H. rostrupii* Lind: on 1 Greenl [603, p. 177]; on 13 Frank [604].
- Heterosporium avenae* Oud.: on 21, 23 Alaska [1037]; on 23 Alaska [1038].
- H. phlei* Gregory: on 21 Alaska [175, 1037].
- Laestadia graminicola* Rostr.: on 13 Frank [604].
- Leptopeziza groenlandica* Rostr.: on *P. sp.* Greenl [901].
- Leptosphaeria* sp.: on 3 Alaska [1038].
- L. culmifraga* Ces. & de Not.: on *P. spp.* BC [50]; on 13 Frank [604].
- L. culmorum* Auersw.: on 12, 13 Greenl [899]; on 21 Greenl [900].
- L. eustoma* (Fr.) Sacc.: on 13 Frank [604].
- L. microscopica* Karst.: on 1 Greenl [601].
- L. muirensis* Sprague: on 5 Alaska [1037, 1038].
- L. typharum* (Desm.) Karst., sensu Berl.: on *P. spp.* BC [50].
- Leptostromella septorioides* Sacc.: on 13 Greenl [900].
- Lophodermium arundinaceum* (Schrud. ex Fr.) Chev.: on *P. sp.* Greenl [902]; on 1 Greenl [602]; on 3, 6, 23 Alaska [1038]; on 3, 12, 13, 21 Greenl [899].
- L. arundinaceum* var. *alpinum* Rehm: on 13 Greenl [601].
- Metasphaeria culmifida* (Karst.) Sacc. f. *poae* (Niessl) Berl.: on 16 BC [50].
- M. neglecta* (Niessl) Sacc.: on *P. sp.* Greenl [900].
- Microthyrium culmigenum* Syd.: on 6, 23 Alaska [1038].
- Mollisia graminis* (Desm.) Karst.: on *P. sp.* Greenl [901]; on 3, 12, 13, 21 Greenl [899]; on 13 Greenl [902]; on 17 Greenl [900].
- Mycosphaerella* sp. (?*Sphaerella badensis* Niessl): on 11 Alaska [1042].
- M. lineolata* (Rob.) Schroet. (*Sphaerella l.* (Rob.) de Not.): on 21 Greenl [899].
- M. pusilla* (Auersw.) Johans.: on 13 Frank [903]; on 13, 13 × 6 Greenl [603].
- M. tassiana* (de Not.) Johans. (*Sphaerella t.* de Not.): on *P. spp.* BC [50]; on 1 Greenl [901]; on 1, 6, 13 Frank [604], Greenl [602]; on 1, 6, 21 Greenl [601]; on 1, 1 × 6, 6 × 13, 13 Greenl [603]; on 1, 6, 26 Frank [903]; on 3 Greenl [902]; on 3, 12, 13, 21 Greenl [899]; on 6 Frank [600].
- M. tassiana* var. *arthopyrenioides* (Auersw.) Barr: on 6 Frank [52].
- M. tassiana* var. *tassiana*: on 13 Frank [52].
- M. tulasnei* (Jancz.) Lindau: on 3, 6, 23 Alaska [1038].
- M. wichuriana* (Schroet.) Johans.: on *P. sp.* BC [50]; on 6 Greenl [601]; on 13 Keew [604], Greenl [602].
- Ophiobolus graminis* Sacc.: on 30, 31 Alaska [1042].
- Passalora graminis* (Fckl.) Höhn. (*Scolecotrichum g.* Fckl.): brown stripe, strie brune: on 3, 21 Ont 45:43; on 8, 23 Yukon [1042]; on 9 Alaska [1037, 1038], BC [535], Man 43:39; on 19 NB 60:84; on 21 BC 33:18, [535], Alta 46:31, Alaska [175, 1037], Alaska BC Alta Man Ont [1034].
- Pellicularia filamentosa* (Pat.) Rogers: on 5 Ont [1034].
- Phaeoseptoria festucae* Sprague: on 21 Alaska [1037].
- Phoma graminis* West.: on 6 Alaska [175, 1038].
- Phyllachora graminis* (Pers.) Fckl.: on *P. sp.* BC [50]; the fungus or host appears to have been misdetermined.
- Pistillaria culmigena* (Mont. & Fr.) Berk.: on dead leaves of 21 and other grasses Man [93, p. 79].
- Platyspora pentamera* (Karst.) Wehm. (*Clathrospora p.* (Karst.) Berl., *Pleospora p.* Karst.): on *P. spp.* BC [50]; on 1, 6, 13 Frank [903], Greenl [601, 602]; on 1, 6 × 13, 13 Greenl [603]; on 1, 13 Frank [604], Greenl [899]; on 13 Greenl [901].
- P. planispora* (Ell.) Wehm. (*Clathrospora p.* (Ell.) Berl.): on 21 Frank [604].
- Plenodomus meliloti* Dearn. & Sanford: from 21 Alaska [592].
- Pleospora heleocharidis* Karst.: on 15 BC [50].
- P. heleocharidis* var. *arctica* (Karst.) Wehm. (*P. karstenii* Berl. & Vogl.): on 1 Greenl [601]; on 6, 13 Greenl [602].
- P. helvetica* Niessl: on *P. spp.* BC [50]; on 13 Frank [52].
- P. herbarum* (Fr.) Rabh. var. *h.* (*P. discors* (Dur. & Mont.) Ces. & de Not.): on *P. sp.* BC [50]; on 1, 1 × 6 Greenl [603]; on 6 Greenl [601].
- P. magnusiana* Berl.: on 1 Frank, 3 Man, 6, 13, 21 Frank [604]; on 6 Alaska [175, 1037].
- P. phaeocomoides* (Berk. & Br.) Wint. var. *infectoria* (Fckl.) Wehm. (*P. i.* Fckl.): on 13 Alaska [175, 1037].
- P. scrophulariae* (Desm.) Höhn.: on 1 Frank, 6 Mack [604].

Poa

- Pleospora vagans* Niessl (*P. deflectens* Karst.): on 1 Greenl [601, 902]; 3 Yukon, 6 Frank [600]; on 13 Frank [604].
- Puccinia graminis* Pers.: stem rust, rouille de la tige: on *P. sp.* NS [1138]; on 8, 14, 18 cult. Man 43:39; on 9, 21 Ont [828]; on 9 Man 55:52, Ont 48:35; on 21, 21 Merion Alta 58:46, Sask Man 55:52. From pathogenicity tests, Johnson suggested that the rust on Merion bluegrass was *P. graminis* 'var.' *poae*. However, from infection experiments and a study of pore number in the urediniospores, Britton and Cummins [132] concluded that it was *P. graminis* f. *sp. agrostidis* Erikss. It is also apparently distinct from *P. graminis* f. *sp. poae* Erikss. & Henn., which is known on *P. spp.* in Europe. On the other hand, from purely pathogenicity tests with aeciospores from barberry, Johnson and his coworkers, 44:18, 45:20, obtained some evidence that *P. graminis* f. *sp. poae*, as distinct from f. *sp. agrostidis*, may occur in the Maritime Provinces. Cultures from 9 and *Berberis vulgaris* from Ont were used in 'intervarietal' crosses of *P. graminis* [505].
- Puccinia poae-nemoralis* Otth (*P. poae-sudeticae* (West.) Jørstad, *P. poarum* auct.): leaf rust, rouille des feuilles: II III on *P. sp.*, 19 Sask., 21 Sask Man [93, p. 70]; on 1, 13, 17, 20, 21, 23, 24 Alaska [1037]; on 3, 20, 23 Alaska [1038]; on 5, 9, 19, 21 Ont, 6 Que [828]; on 5, 16, 19 Alta, 21 Alaska Alta Man Ont Que [15, p. 150]; on 7 Alta 51:41; on 9 BC 50:47; on 9, 21 BC [535]; on 13, 21 23 Alaska [175]; on 13, 19 Alaska Yukon, 29, 32 Alaska [1042]; on 19, 21 NB 60:84; on 21 PEI 34:25; on 21 Merion Alta 54:54; on 24 Alta Yukon 55:52.
- P. poae-nemoralis* ssp. *hyperarctica* Savile: on 28, 28 × 13 Frank [971, p. 705].
- P. poae-nemoralis* ssp. *poae-nemoralis*: on 6, 13 Frank [971].
- P. recondita* Rob. ex Desm. (*P. rubigo-vera* Wint. var. *agropyri* (Erikss.) Arth.): II III on 6 Alaska [1037]; on 7 Man [93, p. 71]; on 7 Man, 22 Alta [15, p. 179].
- Pyrenochaeta terrestris* (Hans.) Gorenz, Walker & Larson: on 23 Alaska [1037].
- Pyrenopeziza karstenii* Sacc.: on *P. sp.* Alaska [176]; on 3, 21, 23 Alaska [1038].
- Pyrenophora trichostoma* (Fr.) Fckl. (*Pleospora t.* (Fr.) Ces. & de Not.): on 21 Alaska [175, 1037].
- Pythium debaryanum* Hesse: on 6, 23 Alaska [1037].
- P. graminicola* Subram. (*P. arrhenomanes* Drechsl.): on 9, 21 Sask 37:6, [1034].
- Ramularia pusilla* Unger (*Ovularia p.* (Ung.) Sacc. & D.Sacc.): on 21, 31 Alaska [1037, 1038]; on 21 Alaska [1042].
- Rhizoctonia solani* Kühn: on 5 in turf Ont 32:iv; *R. solani* race 5 Sprague, cause of sharp eye spot of 9 BC [1041]; on 11, 21 Alaska [1042]; on 23 Alaska [1037].
- Rhynchosporium orthosporum* Caldwell: on 31 Alaska [1037].
- R. secalis* (Oud.) Davis: on 11 Alaska [175, 1037].
- Sclerotinia borealis* Bubák & Vleugel: on 4, 9 cult. BC [377].
- Sclerotium fulvum* Fr.: on 3 Greenl [900].
- Selenophoma donacis* (Pass.) Sprague & Johnson: on 6, 13 Greenl [1034]; on 19 Que [1041]; on 21, 23 Yukon [1042].
- S. donacis* var. *stomaticola* (Bäuml.) Sprague & Johnson: on 6 Greenl [1034]; on 8 Yukon, 19, 21 Alaska [1042]; on 23 Alaska [1037, 1038]; these northern records apparently refer to a fungus not distinct from *S. drabae* (q.v.).
- S. drabae* (Fckl.) Petr. (*Rhabdospora d.* (Fckl.) Berl. & Vogl., *R. groenlandica* Lind, *Septoria nebulosa* Rostr., *S. semilunaris* Johans.): on 1, 6, 13 Greenl [601]; on 6 Frank [600]; on 6, 6 × 13, 13 Greenl [603]; on 13 Man Keew, 21 Frank [604]; on 13 Frank [903], Greenl [602, 899, 902].
- S. everhartii* (Sacc. & Syd.) Sprague & Johnson: on 9 Alaska Yukon, 31 Alaska [1042].
- Septogloeum oxysporum* Sacc., Bomm. & Rous.: on 11 Alaska [175, 1037].
- Septoria macropoda* Pass.: on 5 Alaska [1037], Que [1041].
- S. macropoda* f. *sitadekaensis* Sprague: on 20 Alaska [1037, 1038].
- S. oudemansii* Sacc.: on 3, 9, 16, 21, 23 Alaska [1038]; on 6, 25 Alaska [1037]; on 13 Yukon, 21, 31 Alaska, ?microconidial state on 32 Alaska [1042]; on 21 Que [1041].
- Spermospora subulata* (Sprague) Sprague: on 6, 24 Alaska [1037].
- Sphaerella graminum* Sacc. & Scalia: on 23 Alaska [175, 1037].
- Sporotrichum poae* Pk.: on 21 Man 24:81, but not in [93].
- Stagonospora arenaria* Sacc.: on 1 Alaska [175], Greenl [601].
- S. intermixta* (Cke.) Sacc.: on 31 Alaska [1042].
- Trochila fuscella* Karst. (*Naevia f.* (Karst.) Lind): on 13 Greenl [603].
- Typhula* spp.: under controlled conditions, *T. incarnata* Lasch ex Fr. (*T. itoana* Imai) caused 60% infection and moderate damage to 21; *T. ishikariensis* Imai (*T. idahoensis* Remsb.), 95% infection and moderate damage; *T. trifolii* Rostr., 15% infection and slight damage [218]; *T. ishikariensis* isolated from 21 Yukon [592].
- Urocystis agropyri* (Preuss) Schroet.: on *P. sp.* Alaska [175, 1037]; on 9 Ont [292].
- Uromyces dactylidis* Otth (*U. poae* Rabh.): leaf rust, rouille des feuilles: on 3 Greenl [899]; on 19, 21 Alta [93, p. 72]; on 19, 21 Alta, 24 NS [15, p. 184]; on 24 NS [1138].
- Ustilago agrestis* Syd. (*U. spegazzinii* Hirschh. var. *a.* (Syd.) G.W.Fischer & Hirschh.): smut, charbon: on *P. sp.* Ont [292].
- U. salvei* Berk. & Br. (*U. striiformis* (West.) Niessl): stripe smut, charbon strié: on 21 Man 33:18, 58:46, [93, p. 62], Ont 34:26, [292], Que 40:27, NB 60:84.
- Barley yellow dwarf virus: yellow dwarf, nanisme jaune: isolated from 21 Ont [1036].

Podophyllum L.

BERBERIDACEAE

Perennial herbs of e. N. America and e. Asia.

1. *P. peltatum* L., may-apple, pomme de mai; in Canada in s.w. Que and s. Ont.
- Phyllosticta podophylli* (Curt.) Wint.: leaf spot, tache phyllostictéenne: on 1 cult. Que 43:114.
- Puccinia podophylli* Schw.: rust, rouille: 0 I III on 1 Ont 31:122, [15, p. 289; cf. 828].

Polemonium L.

POLEMONIACEAE

Perennial, rarely annual or biennial, herbs of cool and temperate regions of the northern hemisphere.

1. *P. boreale* Adams (*P. humile* auct.); Greenl, Mack, Alaska and Eurasia.
2. *P. caeruleum* L. (*P. acutiflorum* Willd.); introduced from Eurasia and spread from cult. in E. Canada. 2a, *P. c.* var. *villosum* (Rud.) Brand.; Mack, Alaska and e. Asia.

Gloeosporium roaldii Lind: on 1 Yukon [600, p. 20].

Leptostroma herbarum (Fr.) Lk.: on 2a Alaska [175, 250].

Mycosphaerella polemonii Lind: on dry leaves of 1 Mack [604, p. 71].

M. tassiana (de Not.) Johans. (*M. pachyasca* (Rostr.) Vestergr.): on *P.* spp. BC [50]; on 2a Yukon [600].

Phoma oudemansii Berl. & Vogl.: on 2a Yukon [600].

Pleospora anthylidis Auersw. & Niessl var. *abbreviata* (Fckl.) Wehm. (*Pyrenophora polyphragmoides* Sacc. & Scalia): on 1 Alaska [175].

P. herbarum (Fr.) Rabh.: on 1 Greenl [899, 902].

P. polyphragmia Sacc. (*Pyrenophora p.* (Sacc.) Sacc.): on 1 Mack [604].

Puccinia polemonii Diet. & Holw.: III on 1, 2 Alaska [175; cf. 15, p. 255].

Selenophoma drabae (Fckl.) Petr. (*Rhabdospora d.* (Fckl.) Berl. & Vogl.): on 1 Yukon [600].

Polygala L.

POLYGALACEAE

Low herbs or erect shrubs of most temperate and tropical regions of the world.

1. *P. paucifolia* Willd., flowering wintergreen; in Canada from NB and Que to Man.
2. *P. senega* L., Seneca snakeroot, sénéca; in Canada from NB and Que to Alta.

Puccinia andropogonis Schw. (*P. a.* var. *polygalina* Arth.): on 2 Man [93, p. 65; cf. 15, p. 122].

P. pyrolae Cke.: III on 1 Ont [828; cf. 15, p. 246].

Polygonatum Mill.

LILIACEAE

Perennial herbs of the northern hemisphere.

1. *P. biflorum* (Walt.) Ell.; in Canada in s. Ont.
2. *P. pubescens* (Willd.) Pursh (*P. biflorum* auct.), Solomon's-seal, sceau de Salomon; in Canada in NS and from Que to Man.

Puccinia sessilis Schneid. ex Schroet.: 0 I on 2 NS [1138; cf. 15, p. 130].

Polygonum L.

POLYGONACEAE

Annual or perennial herbs, a few more or less woody erect plants or climbers, of nearly cosmopolitan distribution. Several are important weeds and a number are grown for ornament.

1. *P. alaskanum* (Small) Wight; Alaska and Yukon.

2. *P. amphibium* L.; adventive from Europe, local at Yarmouth, NS. 2a, *P. a.* var. *stipulaceum* (Coleman) Fern. (*P. hartwrightii* Gray, *P. a.* var. *h.* (Gray) Besser); Labr, Nfld and NS to Alaska. 2b, *P. a.* var. *s. f. fluitans* (Eaton) Fern. (*P. f.* Eaton).

3. *P. aviculare* L. (*P. neglectum* Besser, *P. rubescens* Small); naturalized from Europe, common in E. Canada and in Mack. 3a, *P. a.* var. *littorale* (Lk.) W.D.J.Koch (*P. buxiforme* Small); Nfld to Alaska.

4. *P. bistorta* L.; adventive from Europe and a local weed in NS. 4a, *P. b.* ssp. *plumosum* (Small) Hultén (*P. p.* Small); Yukon, Alaska and e. Asia.

5. *P. bistortoides* Pursh; Alaska to Calif.

6. *P. cilinode* Michx., fringed bindweed, renouée à nœuds ciliés; Nfld and NS to Alaska and Calif.

7. *P. coccineum* Muhl. (*P. muhlenbergii* (Meisn.) S.Wats.); NS and Que to BC.

8. *P. convolvulus* L., wild buckwheat, renouée liseron; common in agricultural areas of all provinces.

9. *P. cristatum* Engelm. & Gray; in the US.

10. *P. cuspidatum* Sieb. & Zucc., Japanese knotweed, renouée de Japon; introduced from e. Asia; escaped from cult. and rapidly spreading from Nfld to Ont.

11. *P. erectum* L.; in Canada from Que and Ont to Man and Sask.

12. *P. fowleri* Robins., Labr, NS and Que; also Calif to Alaska and e. Asia.

13. *P. hydropiper* L., common smartweed; Eurasia; naturalized or adventive in E. Canada.

14. *P. hydropiperoides* Michx.; in Canada in NS and NB to Que and Ont.

15. *P. lapathifolium* L., pale smartweed, renouée à feuilles d'oiselle; in Canada from Nfld to BC, particularly abundant in some areas of the prairies, but also confused with 21.

16. *P. pensylvanicum* L.; in Canada in Que and Ont.

17. *P. persicaria* L., lady's-thumb, renouée persicaire; introduced from Europe and occurs in all provinces.

18. *P. punctatum* (*P. acre* HBK), water smartweed; in Canada represented mainly by 18a, *P. p.* var. *leptostachyum* (Meisn.) Small; NS and Que to BC; 18b, *P. p.* var. *majus* (Meisn.) Fassett.

Polygonum

19. *P. ramosissimum* Michx.; Que to BC and Alaska.
 20. *P. sagittatum* L., arrow-leaved tearthumb, gratted; in Canada in Nfld and from Ont and Que to Sask.
 21. *P. scabrum* Moench (*P. tomentosum* Schrank), green smartweed, renouée scabre; naturalized from Europe in every province of Canada, especially the Maritime Provinces.
 22. *P. spargulariaeforme* Meisn.; BC to Calif.
 23. *P. virginianum* L. (*Tovara virginiana* (L.) Raf.); Que and Ont.
 24. *P. viviparum* L.; arctic Alaska to Greenl south to Nfld, Que, Ont, Alta and Wash; also in Eurasia.
- Bostrichonema polygoni* (Ung.) Schroet. (*B. alpestre* Ces.): on 24 Alaska [175], Frank [961, 962], Que Labr. [605].
- Cercospora avicularis* Wint.: on 3, 11 Man, common [93, p. 114].
- Erysiphe polygoni* DC. ex Méral: on *P. spp.* BC [50]; on 3, 11 Sask Man [93, p. 44]; on 3 Ont Que 24:60, PEI 32:105; on 3 NS PEI, 17 PEI [1138]. Germination of conidia takes place through a humidity range of about zero to 100%. When the conidia are dislodged from the conidiophore, the papilla allows uptake of oxygen and escape of CO₂, causing respiration and other germination processes [135].
- Gloeosporium polygoni* Dearn. & House [*Ascochyta p.* (Dearn. & House) Arx, 15a p. 122]; on 20 Ont [93, p. 130].
- Heteropatella umbilicata* (Pers. ex Fr.) Jaap. (*Kellermannia cercosperma* (Rostr.) Lind): on 24 Greenl [601].
- Melanopsichium austro-americanum* (Speg.) G.Beck: on 16 NS [1138]; but see below.
- M. pennsylvanicum* Hirschh.: on *P. sp.* Ont NS [292].
- Metasphaeria polygoni-sagittati* (Schw.) Ell. & Ev.: on old stems of *P. sp.* Man [93, p. 55].
- Mycosphaella confinis* (Karst.) Lind: on 4 Alaska Mack [604].
- M. polygonorum* (Crié) Lind (*Sphaerella f.* (Crié) Sacc.): on 24 Frank [903], Greenl [899, 901, 902].
- M. tassiana* (de Not.) Johans.: on 24 Frank [604], Greenl [603].
- M. tassiana* var. *arctica* (Rostr.) Barr and *M. t.* var. *t.*: on 24 Frank [52].
- M. vivipari* (Wint.) Lind: on 24 Que [52].
- Ovularia avicularis* Pk.: on *P. sp.* Sask, 11 Man [93, p. 122].
- Peronospora polygoni* Thüm. ex Fischer: on 8 BC [535].
- Phacidium polygoni* Rostr.: on leaves of 24 Greenl [900, p. 612].
- Phialea scutula* (Pers.) Gill.: on old *P. sp.* Man [93, p. 41].
- Platyspora pentamera* (Karst.) Wehm. (*Pleospora platyspora* sensu Rostr.): on 24 Greenl [899].
- Pleospora androsaces* Fckl. (*Pyrenophora a.* (Fckl.) Sacc.): on 24 Greenl [603].
- P. anthyllidis* Auersw. & Niessl: on 24 Greenl [603].
- P. cerastii* Oud. (*Pyrenophora c.* (Oud.) Lind): on 24 Frank [604], Greenl [603].
- P. helvetica* Niessl: on 24 Frank Que [52].
- P. herbarum* (Fr.) Rabh.: on 24 Greenl [900, 901, 903].
- P. penicillus* (Schw.) Fckl. var. *p.* (*Pyrenophora chrysospora* (Niessl) Sacc.): on 24 Greenl [900, 901].
- P. scrophulariae* (Desm.) Höhn.: on 24 Mack [604].
- Pseudorhizisma bistortae* (Lib.) Juel (*Pseudopeziza b.* (Lib.) Fckl., *Rhizisma b.* Lib.): on 24 Alaska [175], Greenl [899, 901, 902].
- Puccinia aristidae* Tracy (*P. subnitens* Diet.): 0 I on 3, 11 Sask [93, p. 66]; on 11 Sask 24:60, Man 33:118, [cf. 15, p. 157].
- P. bistortae* (Strauss) DC.: II III on 4, 4a, 24 Alaska [175]; on 4 Greenl [899]; on 24 Alaska [1038], Alaska Alta Frank (mistakenly as Ont) [15, p. 280], Frank [959, 962, 971], Frank Que Lab [605], Que 34:106, [8], Greenl [901].
- P. parca* Arth.: II III on *P. sp.* [175; cf. 15, p. 231].
- P. phragmites* (Schum.) Koern.: 0 I on 15, 16 Ont [828; cf. 850; 15, p. 155].
- P. polygoni-alpini* Cruch. & Mayor: on 1 Alaska [175; cf. 15, p. 279].
- P. polygoni-amphibii* Pers. (*P. p.-a.* var. *convolvuli* (Alb. & Schw.) Arth., and var. *persicariae* (Str.) Arth.): II III on 2a Sask Man, 7 Alta Sask Man, 8 Man [93, p. 70]; on 2a BC Alta Man NS, 7 Ont Que, 8, 14, 15 Ont, 16 Que [15, p. 232]; on 2b Sask 34:106; on 2a, 7 Alta, 8 Man 24:60; on 2, 18 BC [828]; on 2a, 8 NS [1138]; on 9, 23 Ont [828]; on 17 Que 32:105.
- P. septentrionalis* Juel: II III on 24 Alaska [175], Alaska Nfld [15, p. 321], Greenl [902].
- Ramularia anomala* Pk.: on leaves of 7 Man [93, p. 124].
- R. bistortae* Fckl.: on 24 Greenl [899].
- R. rufomaculans* Pk.: common on leaves of 7, 11 Man [93, p. 125].
- Septoria polygonina* Thüm.: on *P. sp.* Alaska [175].
- S. polygonorum* Desm.: on 17 Man Ont [93, p. 139], Que NS 25:80, PEI 34:106, NS PEI [1138]; on 24 Greenl [899].
- Sphacelotheca hydropiperis* (Schum.) de Bary (*Ustilago h.* (Schum.) Schroet., *S. inflorescentiae* (Trel.) Maire, *Ustilago i.* (Trel.) Maire): on *P. sp.* NB, 13, 20 NS, reported on 14, 20 NS [1138]; on 13 Ont Que NS [292], Que 32:105; on 14 Ont NS, 20 Que NS Nfld, 24 Alaska Frank Keew Labr [292]; on 24 Alaska [175], Frank Labr Que [605], Frank [903], Greenl [899, 901]. This smut is not distinct from *Ustilago bistortarum* (q.v.).
- Uromyces polygoni-avicularis* (Pers.) Karst. (*U. polygoni* Fckl.): on 3 Alaska Ont Que, 12 Nfld, 22 BC [15, p. 230]; on 3 BC [535], Alta Que 29:77, PEI 32:105; on 3, 3a Alaska [175]; on 3 NS PEI, 12 NS [1138]; on 11, 14, 19 Ont [828]; 0 I II on 11 Man, II on 3 Man, 3a Sask, III on 23, 19 Sask [93, p. 73]. A strain of this rust is described from Man, the sporidia of which produce mostly aecia, but occasionally uredinia or both but no or few pycnia on 3. The pycnia lacked flexuous hyphae and periphyses. Hosts 3, 11 were not infected [142].
- Ustilago anomala* Kze.: on 6 Man Ont Que NS (but see *U. cilinodis*), 8 Alta Man Ont, 23 Que [292]; on 6 Ont [93, p. 61]; on 8 NS [1138]; on 23 Que 32:105.
- U. anomala* var. *carnea* (Liro) Hirschh.: on 8 Sask NS [953].
- U. anomala* var. *cordai* (Liro) Savile: on 3 Ont [953, p. 669].
- U. anomala* var. *tovarae* Savile: on 23 Que [953, p. 670].

Ustilago bistortarum (DC.) Koern. (*Sphacelotheca hydropiperis* (Schum.) de Bary, *S. h. var. borealis* Clint., *S. b.* (Clint.) Schellenb.): reported on *P. sp.* NS [1138]; on 4a Yukon, 24 Keew Frank [953]; on 24 Alaska [175], Alaska Que [292], BC [957], Yukon Keew Frank [971], Frank [959, 962], Greenl [899, 901].

U. cilinodis Savile: on 6 Ont Que, abundant [953, p. 670].

U. reticulata Liro (*U. utriculosa* auct., [cf. 957, p. 284]: on 21 Alta Ont Que NB NS PEI [953].

U. tenuispora Cif. (*U. polygoni-punctati* Savile [953, p. 670]): on 14 Ont [957]; on 18 var. NS, 18b Ont [953].

U. utriculosa auct. non (Nees) Unger: on 13 Ont (but see *U. anomala* var. *cordai*), 14 Que NS (but see *U. tenuispora*), 15 Alta Man Ont Que NS PEI (but see *U. reticulata*), 16 Ont NB, 17 Ont, 20 NS [292]; on 15 NB NS, 16 NB, 17 NS PEI, 21 NS, *P. sp.* PEI, reported on 14, 20 NS [1138]; on 15 Alta 32:4; on 16 Ont 34:106, NB 31:123; on 17 Sask [93, p. 62], PEI 31:123.

Venturia polygoni-vivipari Arx: on 24 Frank Que [52].

Wettsteinina eucarpa (Karst.) Müller & Arx (*Massaria e.* (Karst.) Lind, *Sphaerella e.* Karst.): on 24 Frank Que [52], Mack [604], Greenl [603, 900, 901].

Aster yellows virus: aster yellows, jaunisse de l'aster: on 8 Sask 53:40.

Polypodium L.

POLYPODIACEAE

Ferns of nearly world-wide distribution.

1. *P. glycyrrhiza* D.C.Eaton (*P. vulgare* L. var. *occidentale* Hook.); Alaska to Calif.
2. *P. virginianum* L. (*P. vulgare* auct.), polypody, tripe de roche; Nfld and NS to BC and Alaska.

Milesia laeviuscula (Diet. & Holw.) Faull: II III on 1 Alaska [15, p. 7; 175], BC F52:152, [1200].

M. laeviuscula f. *glycyrrhizae* Faull: II III on 1 Alaska [175, 286].

M. pycnographis Arth. (*M. polypodophila* Faull): II III on 2 Ont 22:190, Ont Que [828], Ont Que NS [15, p. 7; 286], NS [1138].

Polypogon Desf.

GRAMINEAE

Annual grasses of tropical and warm regions.

1. *P. monspeliensis* (L.) Desf., rabbit-foot grass; naturalized from Europe; casually north to Que; also Alaska to Calif.

Claviceps purpurea (Fr.) Tul.: ergot, ergot: 1 was infected when inoculated with conidia of a rye isolate Alta [172].

Polystichum Roth

POLYPODIACEAE

Ferns of almost cosmopolitan distribution.

1. *P. acrostichoides* (Michx.) Schott, Christmas fern, fougère à faucilles; in Canada in PEI, NS, NB, Que and Ont.

2. *P. lonchitis* (L.) Roth, holly fern, tripe de roche; Nfld, NS, Que, Ont, Yukon and Alaska.

3. *P. munitum* (Kaulf.) Presl; Alaska to Mont and Calif.

Milesia polystichi Wineland ex Faull: II III on 3 BC F55:105, [1198; cf. 15, p. 9; 286].

M. vogesiaca Faull: II III on 3 BC F55:105, [1198; cf. 15, p. 7; 286].

Taphrina faulliana Mix: on 3 BC [535, 735, 1203].

T. polystichi Mix: on 1 Ont NB NS [734, p. 571].

Trabutiella filicina (Sacc. & Scalia) Theiss. & Syd.: on 2 Alaska [175], Alaska BC Alta [960].

Pontederia L.

PONTEDERIACEAE

Stout herbs of N. and S. America.

1. *P. cordata* L., pickerel weed, glaïeul bleu; in Canada from PEI and NS to Ont.

Cercospora pontederiae Ell. & Dearn.: on 1 Ont NS [956]; a *Cercospora* [cf. 190].

Populus L.

SALICACEAE

Trees widely distributed throughout the northern hemisphere, mainly in the temperate zones.

1. *P. acuminata* Rydb., lanceleaf cottonwood, peuplier à feuilles acuminées; in Canada in s. Alta.
2. *P. alba* L., white poplar, abèle; native to Eurasia and naturalized in N. America, long cult. 2a, *P. a.* var. *pyramidalis* Bge. (*P. a.* var. *bolleana* Lauche), introduced from Turkestan.
3. *P. angustifolia* James, yellow cottonwood, liard amèr; in Canada in s. Alta and s. Sask. Wood is used for fuel and fence posts.
4. *P. balsamifera* L. (*P. tacamahaca* Mill.), balsam poplar, peuplier noir; across Canada into Mack, Yukon and Alaska. Wood is used for lumber, veneer, excelsior, pulp and firewood.
5. × *P. canadensis* Moench, including 5a, *P. c.* var. *eugenii* (Simon-Louis) Schelle, Carolina poplar, peuplier de Caroline.
6. *P. deltoides* Bartr., eastern cottonwood, cotonnier; in Canada in s. Que and Ont and also s. Man and s. Sask. The wood, of limited supply, is used for lumber and veneer.
7. × *P. gileadensis* Rouleau (*P. candicans* Ait.), balm of Gilead; supposed to be a native of N. America; often planted and escaped from cult. in Canada from Nfld to Ont.
8. *P. grandidentata* Michx., largetooth aspen, tremble; in Canada from PEI and NS to Que

Populus

and Ont. The wood is used extensively for veneer, matches, boxes and pulp.

9. *P. nigra* L., black poplar, peuplier noir; locally spread from cult. 9a, *P. n.* var. *italica* Muenchh., Lombardy poplar, peuplier de Lombardie; introduced from Europe.
10. *P. sargentii* Dode, cottonwood, liard; in Canada in s. Alta and s. Sask. Wood is used locally for fuel and fence posts.
11. *P. tremuloides* Michx., trembling aspen, tremble; across Canada and into Alaska. Wood is used for veneer, matches, boxes and pulp.
12. *P. trichocarpa* Torr. & Gray, black cottonwood, peuplier noir; Alaska, Yukon, BC to Calif. The most important broad-leaved tree in BC; it produces lumber for boxes, cooperage, veneer and plywood.

Other hosts: 13, × *P. berolinensis* Dipp. 14, *P. magnifica*. 15, × *P. petrowskyana* Schneid. 16, × *P. rasumowskyana* Schneid. 17, *P. simonii* Carr. 18, *P. wilsonii* Schneid.

- Acanthostigma ?clintonii* (Pk.) Sacc.: on bark of *P.* sp. Man [93, p. 50].
- A. ?dispar* Morg.: on bark of *P.* sp. Man [93].
- Agrobacterium tumefaciens* (Sm. & Towns.) Conn: crown gall, tumeur du collet: on 9a NS [1138].
- Aleurodiscus cerussatus* (Bres.) Höhn. & Litsch.: on dead *P.* sp. Man [93, p. 75; 599].
- A. lapponicus* Litsch.: on *P.* sp. Man [599].
- A. roseus* (Pers. ex Fr.) Höhn. & Litsch. [*Laeticorticium roseum* (Pers. ex Fr.) Donk]: on 11, 12 BC [1198]; from 12 BC [1072].
- Alternaria tenuis* auct. sensu Wiltshire: from 12 BC [1198].
- Amphisphaeria ?albomaculans* (Schw.) Cke.: on decorticated *P.* sp. Man [93, p. 52].
- A. bisphaerica* (Cke. & Ell.) Sacc.: on bark of *P.* sp. Man [93].
- Aporpium caryae* (Schw.) Teixeira & Rogers: on *P.* sp. Ont NS, 11 BC Ont, 12 BC [670]; on 11, 12 BC [1198].
- Arcyria cinerea* (Bull.) Pers.: on wood and bark of *P.* sp. Man [93, p. 25].
- A. denudata* (L.) Wettst. and *A. ferruginea* Sauter: on old *P.* sp. Man [93].
- A. incarnata* Pers.: reported on *P.* sp. NS [1138].
- A. occidentalis* (Macbr.) Lister: on *P.* sp. Man [93, p. 25].
- Armillaria mellea* (Vahl ex Fr.) Kummer: armillaria root rot, pourridié-agaric: an important agent of decay, causing a white stringy rot of butt and roots: from 4, 8, 11 Ont F54:75, particularly 11 Ont F51:131; from 4, 11 Alta [1071]; from 11, 12 Alta F57:71, [1071]; on 11, 12 BC [1198]; from 12 BC [1072], [cf. 316].
- Badhamia magna* Pk.: on *P.* sp. Man [93, p. 25].
- B. panicea* (Fr.) Rost.: on bark of *P.* sp. Man [93].
- B. utricularis* (Bull.) Berk.: on *P.* sp. Man [93].
- Beauveria bassiana* (Bals.) Vuill.: from 12 BC [1198]; surely this insect pathogen was only a contaminant.
- Botryophoma populicola* Karst.: on bark of 11 Man [93, p. 132].

- Botrytis ?cinerella* Sacc. & Wint.: on bark of *P.* sp. Man [93, p. 113].
- Caldesiella ferruginosa* (Fr.) Sacc.: on old ?*P.* sp. Man [93, p. 79].
- Caliciopsis calicioides* (Ell. & Ev.) Fitzp.: on 4 Alta [294].
- Calocera cornea* (Batsch ex Fr.) Loudon: common on *P.* sp. Man [93, p. 74]; on 11 BC [1198].
- Calosphaeria exilis* (Alb. & Schw.) Sacc.: on old bark and wood of 4 Man [93, p. 50].
- Camarosporium quaternatum* (Hazsl.) Sacc.: canker, chancre camarosporien: associated with a canker of 11 Sask F54:98.
- Catinella nigro-olivacea* (Currey) Boud.: on old wood of *P.* sp. Man [93, p. 38].
- Cenangium populneum* (Pers.) Rehm: see *Encoelia fascicularis*.
- C. singulare* (Rehm ex Starb.) Davidson & Cash (*C. pruinosum* (Ell. & Ev.) Seav. non Ces.): sooty bark canker, chancre de suie: on *P.* sp. Ont 55:117, [979]; on 11 Yukon F62:121.
- Ceratostoma brevirostre* (Fr.) Sacc.: on decayed wood of *P.* sp. Man [93, p. 51].
- Chaetosphaeria ?atrobarba* (Cke. & Ell.) Sacc.: on old *P.* sp. Man [93, p. 50].
- Chlorosplenium aeruginascens* (Nyl.) Karst.: on *P.* sp. Man [93, p. 39].
- C. aeruginosum* (Oed. ex S.F.Gray) de Not. (*Chlorociboria aeruginosa* (Oed.) Seav.): on rotten wood of *P.* sp. Alaska [175], NS [1138].
- Chondromyces aurantiacus* (Berk. & Curt.) Thaxt.: on bark of *P.* sp. Man [93, p. 24].
- Ciboria caucis* (Rebent. ex Pers.) Fckl.: on fallen male catkins of 1 Man [93, p. 39].
- Ciborinia pseudobifrons* Whetz. ex Groves & Bowerman: on fallen leaves and twigs of *P.* spp. Ont Que [376].
- C. seaveri* Groves & Bowerman: on 11 BC [1198]; until apothecia are collected in BC and/or Alta the occurrence of this pathogen in Canada must remain in doubt.
- C. whetzelii* (Seav.) Seav. (*C. bifrons* (Whetz.) Whetz., *Sclerotinia b.* Whetz. non Seav. & Shope, *S. whetzelii* Seav.; stat. sclerot. *Sclerotium bifrons* Ell. & Ev. ex Sacc. & Syd.): ink spot, tache d'encre: on sclerotia from decayed leaves of 11 Ont Que; "a striking field character is the presence of rhizoids at the base of the stipe [of the apothecium] where it arises from the sclerotium." [1040]; the sclerotia are reported on *P.* sp. Ont 29:64, Que 30:82; on 4, 11 Man [93, p. 126]; on 6 Ont 32:85; on 9 Que 58:105; on 11 BC 37:70, Alta 39:99, F55:91, Man F54:98, Ont F55:67, Que 40:87, F52:38, [979], NB 35:63, NS 33:63, [1138], NB NS Nfld F57:24; in some seasons infection may be heavy Ont F55:24, NB F56:24.
- Cienkowskia reticulata* (Alb. & Schw.) Rost.: on *P.* sp. Man [93, p. 25].
- Cladosporium subsessile* Ell. & Barth.: leaf spot, tache des feuilles: on *P.* sp. Alaska [175]; on 4 Man, 11 Sask Man [93, p. 116]; on 8 Ont 34:76; on 8, 11 Que F58:35; on 11 Alta 40:87, Sask F54:98, Que 39:99, Nfld F56:25.
- Clitocybe cyathiformis* (Bull. ex Fr.) Kummer: on 12 BC [1198].
- Coccomyces coronatus* (Schum.) de Not.: on dead leaves of *P.* sp. NS [1138].
- Collybia velutipes* (Curt. ex Fr.) Kummer: from butt rot of 11 Alta [1071], Ont F51:131, [56].
- Comatricha flaccida* (Lister) Morgan: on *P.* sp. Man [93, p. 25].

- Coniophora olivacea* (Fr.) Karst.: on *P. sp.* Man [93, p. 75]; on 11 BC [1198].
- C. puteana* (Schum. ex Fr.) Karst. (*C. cerebella* Pers.): on fallen *P. sp.* Man [93].
- C. suffocata* (Pk.) Masee: on *P. sp.* Man [93].
- Conoplea fusca* Pers. (*Streptothrix mounceae* Sumst.): on *P. sp.* Sask, unidentified hosts BC Ont [484].
- Coprinus aphthosus* Fr.: on decaying *P. sp.* in root cellar Man [93, p. 107].
- C. micaceus* Fr.: from trunk rot of 4 Alta F59:92, [1071]; from butt rot of 11 Ont [56].
- Coriolellus malicola* (Berk. & Curt.) Murr. (*Trametes m.* Berk. & Curt.): on dead wood of *P. sp.* Man [93, p. 85].
- C. variiformis* (Pk.) Sarkar (*Trametes v. Pk.*): on old logs of 12 Alaska [175, 555].
- Corticium analogum* (Bourd. & Galz.) Burt: on 12 BC [1198]; from 12 BC [1072]; see *Acer*.
- C. arachnoideum* Berk.: on old *P. sp.* Man [93, p. 75].
- C. bicolor* Pk.: on 11 BC [1198].
- C. confluens* (Fr.) Fr. (*C. rubellum* Burt): on old *P. sp.* Man [93, p. 76].
- C. contiguum* Karst. (*C. crustaceum* (Karst.) Höhn. & Litsch.): on *P. sp.* Man [93, p. 75] from 12 BC [1072].
- C. expallens* Bres.: from 4 Alta [1071]; on 12 BC [1072, 1198].
- C. galactinum* (Fr.) Burt: on *P. sp.* Ont [1160]; on 12 BC [1072, 1198]; see *Abies*.
- C. incrustans* Höhn. & Litsch.: on log of *P. sp.* Ont [788].
- C. lactescens* Berk. [*Gloeocystidiellum l.* (Berk.) Boidin]: on *P. sp.* Man [93, p. 76].
- C. laeve* Pers. ex Fr.: on *P. sp.* Man [93]; from 11 Alta [1071]; on 11 NB F53:24; on 12 BC [1072, 1198]; see *Abies*.
- C. luridum* Bres.: on *P. sp.* Man [93]; see *Alnus*.
- C. pelliculare* Karst.: on 11 BC [1198]; see *Abies*.
- C. pini-canadensis* (Schw.) Rogers & Jacks. (*Peniophora piceina* Overh.): on old bark and wood of *P. sp.* Man [93, p. 78].
- C. porosum* Berk. & Curt.: on old *P. sp.* Man [93, p. 76].
- C. scutellare* Berk. & Curt.: on twig of *P. sp.* Man [93, p. 76].
- C. sulphureum* (Pers. ex Fr.) Fr. (*Hypochnus fumosus* Fr.): on fallen *P. spp.* Man [93, p. 77]; on 11 BC [1198]; see *Abies*.
- C. tuberculatum* Karst.: on 12 BC [1072, 1198].
- C. vellereum* Ell. & Cragin: on old *P. sp.* Man [93, p. 76]; from 4 Alta [1071]; on 12 BC [1072, 1198].
- Coryne sarcoides* (Jacq. ex Fr.) Tul.: on old wood of *P. sp.* Man [93, p. 39].
- C. sarcoides* var. *urnalis* (Nyl.) Karst.: on *P. sp.* Man Ont [93].
- Crepidotus calolepis* (Fr.) Karst.: on old *P. sp.* Man [93, p. 100].
- C. cinnabarinus* Pk.: on old logs of *P. sp.* Man Ont [93].
- C. fulvotomentosus* Pk.: on old *P. sp.* Man [93]; on 12 BC [1198].
- C. haerens* (Pk.) Sacc.: on old *P. sp.* Man [93].
- C. herbarum* Pk.: on old *P. sp.* Man [93]; on 12 BC [1198].
- C. sepiarius* Pk.: on old *P. sp.* Man [93].
- Cryptosphaeria populina* (Pers.) Sacc.: on *P. sp.* BC [50]; on bark of dead branches of 11 Sask Man [93, p. 57].
- Cucurbitaria staphula* Dearn. ex Arnold & Russell: limb gall, tumeur des branches: on 4 Sask 29:64, 43:98, [93, p. 52]; on 4, 11 Sask [12, p. 501]; on 12 BC F57:85, [1199]; the conidial state is a *Pseudodichomera* [12].
- Cylindrosporium occulatum* Ell. & Ev.: on 12 Alaska [983, 1038]; if distinct from *Septoria musiva*, of which *C. occulatum* is a synonym [1076], possibly the fungus here is *S. populicola* (q.v.).
- Cyphella fasciculata* (Schw.) Berk. & Curt.: on old *P. sp.* Man [93, p. 76].
- C. minutissima* Burt: common on dead *P. sp.* Sask Man [93].
- Cytidia salicina* (Fr.) Burt: on 11 NB F53:24.
- Cytospora chrysosperma* (Pers.) Fr.: canker, chancre cytosporéen: on *P. sp.* Ont F56:58; on hybrid *P. sp.* Alta Sask 30:82; on 4, 11 Sask F51:144; on 5a Que 32:85, 59:83; on 6, 11 Sask Man [93, p. 52]; on 8 Ont 58:105; on 11 BC [1198], Alta F54:11, F55:91; on 9a BC 36:69, Que 61:105; on 11, 18 Ont 34:76; on 14 Que 42:94.
- C. pulcherrima* Dearn. & Hansbr.: on 12 BC [253].
- Daedalea confragosa* Bolt. ex Fr.: on 12 BC [1072, 1198]; recorded on 11 BC [1198].
- D. unicolor* Bull. ex Fr.: white spongy rot, carie blanche spongieuse: on 4 NB 50:116; on 11 Sask [93, p. 81]; from 11 Ont [56]; on 12 BC [1072, 1198]; see *Acer*.
- Daldinia grandis* Child: on *P. sp.* Man [93, p. 59].
- Dasyscyphus corticalis* (Pers. ex Fr.) Karst. (*Lachnella c.* (Pers. ex Fr.) Fr.): common on bark of *P. sp.* Man [93, p. 40], NS [1138].
- D. virgineus* (Batsch ex Fr.) Fckl.: on 12 Alaska [176].
- Desmazierella echinata* Dearn.: on old wood of *P. sp.* Man [93, p. 40].
- Dianema harveyi* Rex: one collection on *P. sp.* Man [93, p. 25].
- Diaporthe eres* Nit.: on 12 BC [50].
- Diatrype bullata* Fr.: on 12 Alaska [175]; ? on old wood of *P. sp.* Man [93, p. 59].
- D. macounii* Ell. & Ev.: on *P. sp.*, 12 BC [50].
- ?*Dichaena populi* Dearn. & Bisby: on galls of 4 Man [93, p. 43]; not a *Dichaena* but a recent study of fresh material suggests that the fungus is close to *Physalospora* (fide Ruth H. Arnold).
- Diderma chondrioderma* (de Bary & Rost.) G.Lister: on bark of *P. sp.* Man [93, p. 25].
- Didymella canadensis* Ell. & Ev.: on dead limbs of *P. sp.* Man [93, p. 53].
- Didymium crustaceum* Fr.: on decayed *P. sp.* Man [93, p. 25].
- D. melanospermum* (Pers.) Macbr.: on old *P. sp.* Man [93, p. 26].
- Dinemasporium robiniae* Gerard: on old leaves of *P. sp.* Man [93, p. 133].
- Discosia artocreas* Tode ex Fr.: on old leaves of *P. sp.* Man [93, p. 133].
- Dothichiza populea* Sacc. & Briard: canker, chancre dothichizéen: on 9a Ont 46:78, F52:74, Que 48:99; F53:48, NB F57:25, [1138], NS 29:64; on 9a × 5a Que F58:35; on 17 Que 50:117; on trees imported from the US, 50:117. According to Butin [174] the perfect state is *Cryptodiaporthe populea* (Sacc.) Butin and the conidial state is a *Chondroplea*, *C. populea* (Sacc.) Kleb.
- Dothiora sphaerioides* (Pers.) Fr.: on 8 Ont F59:65.
- Dothiorella populnea* Thüm.: canker, chancre dothior-elléen: on 11 Sask F54:98.
- Eichleriella spinulosa* (Berk. & Curt.) Burt: on bark of

Populus

- P. sp.* Man [93, p. 74]; on 4 Alaska [555], Alta 48:100; on 12 BC [1072, 1198].
- Encoelia fascicularis* (Alb. & Schw. ex Fr.) Karst.: on *P. sp.* Sask Man [93, p. 39]; on *P. sp.*, 11 NS [1138]; on 11 BC F57:85, [1199], Que 39:99, NB Nfld F53:24.
- Eutypa acharii* Tul.: dieback, dépérissement eutypéen: on branches of *P. sp.* Man [93, p. 57]; on 12 BC F58:102, [1203].
- E. lata* (Pers.) Tul.: on bark or wood of 11 Man [93, p. 57].
- Eutypella stellulata* (Fr.) Sacc.: on *P. sp.* BC [50].
- Exidia glandulosa* Bull. ex Fr.: common on branches of *P. sp.* Man [93, p. 74]; on 11 NB F53:24.
- Favolus alveolaris* (DC. ex Fr.) Qué.: on *P. sp.* Ont [795].
- Fenestella phaeospora* Sacc.: on branches of *P. sp.* Man [93, p. 57].
- Flammula alnicola* (Fr.) Kummer: yellow checked rot, carie jaune craquelée: on old stump of *P. sp.* Ont [93, p. 101].
- Fomes conchatus* (Pers. ex Fr.) Gill.: from 11 NB F53:22.
- F. fomentarius* (L. ex Fr.) Kickx: white mottled rot, carie blanche madrée: on 4 BC F60:110, Alta F59:92; from 4, 8, 11 Ont F55:62; from 11 Alta [1071]; on 11 NWT (Liard R.) F55:91, Sask Man [93, p. 81]; on or from 12 BC [1072, 1198].
- F. igniarius* (L. ex Fr.) Kickx: white trunk rot, carie blanche du tronc: on *P. spp.* Sask Man F53:106, Ont F51:134, NB NS PEI F54:24; from 4, 11 Alta [1071]; occasionally on 4 but common on 8, 11 Ont F54:72; on 11 Man F60:80; sporophores also common on 11 and less so on 4, 8 Ont F55:59; on 8 NB, 11 NB NS F54:24; on 11 Alaska [175, 555], BC [1072], Alta-Man F51:144, Sask Man [93, p. 81], Ont F53:84, Que F53:40; on 11, 12 BC F54:129, [1198]; on *P. sp.* NS, 11 NB PEI [1138].
- F. igniarius* var. *nigricans* auct. Am.: common on *P. spp.* Sask Man [93, p. 81].
- F. igniarius* var. *populinus* (Neuman) Campbell: from 4, 11 Alta F58:82; from 8, 11 Ont [791]; most important cause of decay of 11 in Ont F52:70, [56, 316]; from 11 BC [1072], Ont F51:13, NB F53:22; from 11, 12 Alta F57:71; for biology of the fungus and etiology of the disease, see [885]; for culture studies, see [791]. Factors affecting germination of the spores were studied, but it was concluded that only a direct experimental approach can show clearly the optimum conditions for infection [331]. There was found associated with *F. igniarius* var. *populinus* 63 distinct fungi including representatives of the following genera: *Alternaria*, *Candida*, *Cephalosporium*, *Chaetomium*, *Conochaeta*, *Coniothyrium*, *Cytospora*, *Dicoccum*, *Epicoccum*, *Haplographium*, *Hericium*, *Hormodendron*, *Illosporium*, *Libertella*, *Mucor*, *Penicillium*, *Phialophora*, *Phlebia*, *Phoma*, *Pullularia*, *Radulum*, *Stereum*, *Trichoderma*, *Tritirachium* and *Verticillium*. The spatial and zonal distribution of these fungi are delineated [330].
- F. pinicola* (Sw. ex Fr.) Cke.: brown cubical rot, carie brune cubique: on *P. sp.* Ont F51:134; on 4 Man, 11 Sask [93, p. 81]; from 4 Alta Man [791]; on 8 Ont [740]; from 11 Alta [1071], Ont [56]; on 12 BC [1072, 1198].
- F. tenuis* Karst.: cause of a rot of old logs of 11 Alaska [555].
- Fuligo intermedia* Macbr.: on bark of *P. sp.* Sask [93, p. 26].
- Fusarium lateritium* Nees: canker, chancre fusarien: on nursery-grown 12 BC [83].
- F. solani* (Mart.) App. & Wr.: from canker of 6 Que [107].
- F. sporotrichioides* Sherb.: from dead branches of *P. sp.* Man [93, p. 118].
- Fusicladium saliciperdatum* (All. & Tub.) Tub.: on 7 NS [1138]; probably a species of *Pollacia* (q.v.).
- Ganoderma applanatum* (Pers. ex Wallr.) Pat. (*Fomes applanatus* Pers. ex Wallr.): white mottled rot, carie blanche madrée: on *P. spp.* Sask Man [93, p. 81], Ont F51:134; on 4 Alta F53:31; on 4, 11 Alaska [175]; on 11 Alta F54:111, NS [1138]; on 11, 12 Alaska [555], BC [1198]; an important saprophyte on 12 BC [1072].
- "*Gloeocystidium*" *karstenii* Bourd. & Galz. [*Gloeocystidiellum k.* (Bourd. & Galz.) Donk]: white spongy rot, carie blanche spongieuse: on 4 Alaska [175]; from 11 Ont [56]; on 12 BC [1198].
- Grandinia helvetica* (Pers.) Fr.: on 12 BC [1198].
- Haplographium delicatulum* Berk. & Br. (*Scopularia populi* Dearn. & Bisby): on bark of dead *P. sp.* Man [93, p. 126; cf. 482].
- Helicoma berkeleyi* Curt.: on bark of *P. sp.* Man [93, p. 119].
- H. monilipes* Ell. & Johnson and *H. olivaceum* (Karst.) Linder: on bark of fallen *P. sp.* Man [93].
- Heliomyces gracilis* Morgan: on bark of dead *P. sp.* Man [93, p. 120].
- Helotium amenti* (Batsch) Fckl.: possibly on fallen catkins of *P. sp.* Man [93, p. 40].
- H. citrinum* (Hedw.) Fr.: on *P. sp.* BC [1198], Man [93, p. 40]; on 12 Alaska [1038].
- H. epiphyllum* (Pers.) Fr.: on fallen leaves of *P. sp.*, etc., Man Ont [93].
- H. virgultorum* (Vahl ex Fr.) Karst.: on old *P. sp.* Man [93].
- Hemitrichia stipata* (Schw.) Macbr.: on old wood of *P. sp.* Man [93, p. 26]; reported on decaying *P. sp.* NS [1138].
- H. vesparium* (Batsch) Macbr.: reported on decaying 11 NS [1138].
- Hericium ramosum* (Bull. ex Mérat) Letellier (*H. laciniatum* Leers ex Banker): white spongy rot, carie blanche spongieuse: from 11 Ont [56]; on 11, 12 BC [1198]; on 12 Alaska [175, 555], BC [1072].
- Heterochaetella dubia* (Bourd. & Galz.) Bourd. & Galz.: on *P. sp.* Ont [619].
- Hormiactis ?alba* Preuss: on bark of *P. spp.* Man [93, p. 121].
- Humarina trachyderma* (Ell. & Ev.) Seav.: on decayed *P. sp.* Man [93, p. 36].
- Hyalopus ?ochraceus* Cda.: on old bark of *P. sp.* [93, p. 121].
- Hymenochaete badioferruginea* (Mont.) Lév.: on *P. sp.* NS [1138].
- H. cinnamomea* (Pers.) Bres.: on old *P. spp.* Man [93, p. 77].
- H. spreta* Pk.: on *P. sp.* BC [1198].
- H. tabacina* (Sow. ex Fr.) Lév.: from 11 Alta F59:92, [1071].
- Hypocrea rufa* (Pers.) Fr.: on bark of *P. sp.* Man [93, p. 46].
- Hypoxyton fuscum* Pers. ex Fr.: on 11 BC [50].
- H. howeanum* Pk.: on bark of *P. sp.* Man Ont [93, p. 59].
- H. mammatum* (Wahl.) Miller (*H. pruinatum* (Klotzsch) Cke.): hypoxylon canker, chancre hypoxylonien: once on 4 Ont F55:58; on 8 Ont, infrequent, F53:78, Que F58:36; on 11 BC F53:153, 158, [50,

- 1198], Mack F62:101, Alta F53:128, 135, Sask 29:63, Sask Man F53:104, 110, [93, p. 59], Ont 33:63, F53:78, 90, Que F53:46, NB NS PEI but not Nfld F53:21, 30, NS 53:108, [1138].
- Hypoxylon multifforme* Fr.: on *P. sp.*, 12 BC [50].
- H. rubiginosum* Pers. ex Fr. (*H. perforatum* (Schw.) Sacc.): on *P. sp.* BC [50]; common on *P. sp.* Man [93, p. 60].
- H. serpens* (Pers. ex Fr.) Kickx: on *P. sp.* Man [93].
- Hysterium pulicare* (Pers.) Fr.: on 9a NS [1138].
- Hysterographium mori* (Schw.) Rehm: common on old wood, especially of *P. sp.* Man [93, p. 43]; on *P. sp.* NS [1138].
- Kuehneromyces vernalis* (Pk.) Singer & Sm. (*Naucoria lignicola* (Pk.) Sacc.): on decayed *P. sp.* Man [93, p. 103].
- Lachnum ?virgineum* (Batsch) Karst.: on fallen bud scales of 4 Man [93, p. 40].
- Lasiosphaeria canescens* (Pers.) Karst.: on dead *P. sp.* Man [93, p. 51].
- L. hirsuta* (Fr.) Ces. & de Not.: common on old wood of *P. sp.* Man [93].
- L. hispida* (Tode) Fr.: on old *P. sp.* Man [93].
- L. ovina* (Pers.) Ces. & de Not.: on old wood of *P. sp.* Man [93].
- L. spermoides* (Hoffm.) Ces. & de Not.: on decayed *P. sp.* Man [93].
- L. strigosa* (Alb. & Schw.) Sacc. and *L. viridicoma* (Cke. & Pk.) Sacc.: on dead *P. sp.* Man [93].
- Lentinus sulcatus* Berk.: on old wood of *P. sp.* Man [93, p. 90].
- L. vulpinus* Fr.: on wood of *P. sp.* Man [93]; on 9a NS [1138]; on 12 BC [1198].
- Lenzites betulina* (L. ex Fr.) Fr.: occasionally on *P. sp.* Man [93, p. 81], NS [1138]; on old stumps of 11 Alaska [555]; on 11 Alta F59:92.
- L. saepiaria* (Wulf. ex Fr.) Fr.: brown cubical rot, carie brune cubique: on 4, 11 Alta F58:82, Ont F55:62; on 11 BC [1198], Alta F53:131, Ont [56].
- Libertella sp.*: from brown stain and yellow rot of 11 Ont F53:84, [56], NB F53:22; on 11, 12 Alta F57:71; from 11, 12 BC [1198].
- Linospora tetrastora* Thompson: leaf blight, brûlure des feuilles: on 4 BC Alta Ont Que; symptoms on the host and the morphology and life history of the fungus are described [1075, p. 236]; on *P. sp.*, 12 Alaska [175]; on 4 Alta 41:83, F55:91, Sask F54:97, Ont 53:98, F58:60, Que F52:39; on 12 BC F57:85, [1199]; on \times *P. spp.* Que F59:43; sometimes locally epidemic; ascigerous state on 4 Ont F63:70.
- Lophidium compressum* (Pers.) Sacc.: on twigs of *P. sp.* Man [93, p. 52].
- Lophiostoma triseptatum* Pk.: very common on branches of *P. spp.* Man [93, p. 52].
- L. vestitum* Pk.: on dead branch of *P. sp.* Man [93].
- Macrophoma tumefaciens* Shear (*Diplodia t.* (Shear) Zalasky): branch gall, tumeur des branches: on *P. sp.* Man F52:96; on *P. sp.* Ont, 4 Sask, 11 Alta, 12 BC [12]; on *P. sp.* Alta Ont, 4 Sask, 11 Alta Sask Man, 12 BC [1193, p. 1050]; on 4 Alta 38:93; on 11 Alta F51:144; Man F60:80; on ?11 Sask F54:98; on 12 BC 48:100.
- Marasmius epiphyllus* Fr.: common on fallen leaves of *P. sp.* Man [93, p. 91].
- Marssonina brunnea* (Ell. & Ev.) Magn.: leaf spot, tache des feuilles: on *P. sp.* Man 43:98; on 5a NS F56:26; on 8 NS, 11 Ont NS 53:109; on 8, 11 NB F56:25; on 11 BC F58:102, [1203].
- M. castagnei* (Desm. & Mont.) Magn.: on 2 Ont [887], 45:104; on 2b Man 38:93; on 4 Man, 11 Sask [93, p. 131]; on 5a Ont 48:100; on 8 Que NS 45:104; on 11 BC 44:101, 48:100, Alta 51:107, Sask Man 54:98, Man 41:84. *M. castagnei* may be confined to 2 and its varieties and the fungus on the other hosts is *M. brunnea*, 53:109. The perfect state, *Drepanopeziza populi-albae* (Kleb.) Nannf., is not known in Canada [887].
- M. populi* (Lib.) Magn.: general on introduced hybrid *P. spp.* 4, 6, 8, 11 Que F58:36; on 1 NS 50:117; on 7 NS [1138]; on 8, 11 NS 52:105; on 9a Que 55:117; on 11 BC [1198]; on 12 Alaska [1038]. In Que extensive infections occur on 6, severe infections localized to one or two trees of 4, 8, 11 [108]. The perfect state is *Drepanopeziza populorum* (Desm.) Höhn. [887].
- M. rhabdospora* (Ell. & Ev.) Magn.: on 8 NS 53:109; on 8, 11 Ont [1077]. The perfect state, *Pleuroceras populi* Thompson [1077, p. 655], has been collected on overwintered leaves of 11 in NY State, 54:124.
- M. tremuloides* (Ell. & Ev.) Kleb.: on 11 Alta F52:122, F53:131.
- Massaria salilliformis* Wehm.: on 8 NS [1138]; the host was originally identified as *Fagus grandifolia*, 45:102.
- Melampsora sp.*: on 2 BC F61:125.
- M. abietis-canadensis* Ludwig ex Arth.: leaf rust, rouille des feuilles: on 6 Ont [828]; II III on 8, 11 NS [1138]; on 8 Ont Que NS, 11 Ont Que [15, p. 53]; on 8 PEI 43:98; on 11 Ont F52:74, Nfld F53:25.
- M. albertensis* Arth.: leaf rust, rouille des feuilles: II III on 4, 11 Alaska [175]; on 8 BC F61:124; on 11 BC [1198] and connection with 0 I on *Pseudotsuga* confirmed [1197]; on 11 Alaska [555], BC Alta [15, p. 52], Alta F52:123.
- M. ?larici-tremulae* Kleb.: one collection on *P. sp.* Ont. [828].
- M. medusae* Thüm.: leaf rust, rouille des feuilles: on *P. spp.* Sask Man F52:96; on 4 Sask Man, 6 Sask [15, p. 51]; on 4, 6 Sask, \times *P. spp.* Sask Man [93, p. 63]; on *P. sp.*, 4, 6, 10 Ont [828]; general on 6, 8, 11 and occasionally on \times *P. spp.* Que F58:36; on 11 Alta Sask F51:44, Mack F62:104, Yukon F61:124, NS PEI [1138].
- M. occidentalis* Jackson: leaf rust, rouille des feuilles: II III on 1, 4, 12 BC [15, p. 52]; on 12 Alaska [1038], BC [1198], Alta F61:105; also doubtfully on *P. sp.*, 11 Sask [93, p. 63]. Ziller [1197] demonstrated that *Caecoma occidentale* Arth. on *Pseudotsuga* is connected, not with *M. albertensis*, but with *M. occidentalis*.
- M. tremulae* Tul.: reported on 4 PEI 25:61; a doubtful record [1138].
- Melanconis apocrypta* Ell.: on *P. sp.* NS [1138].
- M. occulta* (Fckl.) Sacc.: on 11 Man [93, p. 58].
- Merulius confluens* Schw. ex Fr.: on 12 BC [1072, 1198].
- M. tremellosus* Schrad. ex Fr.: on *P. sp.* Man [93, p. 82]; on felled timber of *P. spp.* Ont [316]; on or from 11 Alta F53:131, [1071], Sask 48:100; recorded on 11 BC [1198].
- Mollisia cinerea* (Batsch) Karst.: on old wood of *P. spp.* Man [93, p. 40].
- Mycoacia albobiride* (Morg.) Miller & Boyle (*Oxydantia a.* (Morg.) Miller): on 11 BC 48:100, [1198].
- M. macrodon* (Fr.) Miller & Boyle: on 4 Alaska [175].
- Mycosphaerella orbicularis* (Pk.) House: on leaves of 11 BC [50].
- M. populi* Schroet.: on 4, 12 Alaska [175].

Populus

- Mycosphaerella populicola* G.E.Thomson [1076, p. 251], stat. conid. *Septoria populicola*, q.v.): on fallen leaves of 4 Ont in spring; 12 also susceptible [1076]; on 4 Que F58:36.
- M. populifolia* (Cke.) House: on leaves of 6, 12 BC [50].
- M. populorum* G.E.Thompson [1076, p. 246], (stat. conid. *Septoria musiva*, q.v.): leaf spot and canker, tache des feuilles et chancre septorien: causes a canker on 13, 15, 16 and the native hybrids Northwest and Saskatchewan poplars, 4 × 6 and a leaf spot on 4, 7, 11, 12; for a description of the disease, see Bier [81]; occasionally on 8 Que F58:36.
- Myrioconium comitatum* Davis: on leaves of 11 infected by *Sclerotium bifrons*, Man; probably the microconidial state of *Ciborinia whetzelii* [93, p. 122].
- Naematelia nucleata* (Schw.) Fr.: on dead branches of *P. sp.* Man [93, p. 74].
- Nectria galligena* Bres.: canker, chancre nectrien: on *P. sp.* Man F53:108, NS [1138]; on 11 Ont F55:67.
- N. peziza* Tode ex Fr.: common on old *P. sp.* Man [93, p. 46].
- Neofabraea populi* G.E.Thompson (*Pezicula p.* (Thompson) Seav.): on 11 Ont type and 4, 8 Ont [979; 1074, p. 458]; on 11 Ont F62:70.
- Odontia arguta* (Fr.) Quél.: on old *P. sp.* Man [93, p. 80]; on 12 BC [1198]; see *Acer*.
- O. bicolor* (Alb. & Schw. ex Fr.) Quél.: white spongy rot, carie blanche spongieuse: on old wood of *P. sp.* Man [93]; from *P. sp.* Man F52:96; infrequent from butt rot of 11 Ont [56]; from *P. sp.*, 11 Ont [793].
- O. ciliolata* (Berk. & Curt.) Miller: on 11, 12 BC [1198], [cf. 93].
- O. crustosa* (Pers.) Quél.: on old ?*P. sp.* Man [93]; see *Abies*.
- O. fimbriata* Pers. ex Fr.: on decaying 11 Man Ont [93]; on 12 BC [1198]; see *Acer*.
- O. fusco-atra* (Fr.) Bres.: common on *P. sp.* Man [93].
- O. lactea* Karst.: on old *P. sp.* Man [93].
- O. spathulata* (Fr.) Litsch.: on 11 BC [1198].
- O. uda* (Fr.) Bres.: on old ?*P. sp.* Man [93].
- Oidiodendron tenuissimum* (Pk.) Hughes: on *Poria sp.* on *P. Ont* [54].
- Orbilbia xanthostigma* Fr.: on decaying *P. sp.* Man [93, p. 41].
- Ostropa cinerea* (Pers.) Fr.: on fallen branches of *P. sp.* Man [93, p. 42].
- Panus rudis* Fr.: on 11, 12 BC [1198].
- P. salicinus* Pk.: recorded on *P. sp.* BC [1198].
- P. stipticus* (Bull. ex Fr.) Fr.: on *P. sp.* NB F53:25.
- P. stipticus f. luminescens* Buller: on *P. sp.* Man [93, p. 93].
- Patella setosa* (Nees) Seav.: on decayed wood of *P. sp.* Man [93, p. 37]; *P. setosa* sensu Seaver is *Scutellinia crinaceus* (Schw.) Kuntze, fide Denison, Mycologia 51:627. 1959.
- Patellaria atrata* (Hedw.) Fr.: rather common on old *P. sp.* Man [93, p. 41].
- Pellicularia flavescens* (Bon.) Rogers (*Corticium f.* (Bon.) Masee, *C. fenestratum* Overh.): on decayed *P. sp.*, ?4 Man [93, p. 76].
- P. isabellina* (Fr.) Rogers (*Hypochnus isabellinus* Fr.): on old *P. sp.* Man [93, p. 77]; on or from 12 BC [1072, 1198].
- P. pruinata* (Bres.) Rogers (*Corticium botroideum* Overh.): on bark of ?*P. sp.* Man [93, p. 75]; see *Acer*.
- Peniophora aspera* (Pers.) Sacc. (*Odontia setigera* (Fr.) Miller): on *P. sp.* Man [93, p. 80]; on 12 BC [1072, 1198]; see *Abies*.
- P. aurantiaca* (Bres.) Höhn. & Litsch.: on 12 BC [1072, 1198].
- P. byssoides* (Pers. ex Fr.) Bres. (*Coniophora byssoides* (Pers. ex Fr.) Fr.): on dead wood of *P. spp.* Man [93, p. 75]; on 4 Alta 48:100; on 12 BC [1072]; see *Abies*.
- P. carnosa* Burt: on 12 BC [1072].
- P. crassa* Burt ex Pk.: on old *P. sp.* Man [93, p. 78].
- P. cremea* (Bres.) Sacc. & Syd.: on 11, 12 BC [1198]; on 12 BC [1072].
- P. dryina* (Berk. & Curt.) Rogers & Jacks.: on 11 BC [1198].
- P. guttulifera* (Karst.) Sacc.: on old *P. sp.* Man [93, p. 78]; see *Acer*.
- P. inusitata* Jacks. & Dearden: on 12 BC [499, p. 150; 1198].
- P. longispora* (Pat.) Höhn.: on old *P. sp.* Man [93, p. 78]; on 12 BC [1072, 1198].
- P. mutata* (Pk.) Höhn. & Litsch. (*P. allescheri* (Bres.) Sacc. & Syd.): on old bark of *P. sp.* Man [93, p. 77-78]; on *P. spp.* Man Ont PEI, 11, 12 BC [705]; on *P. sp.*, 11 NB F53:25; on *P. sp.* PEI [1138]; on 11, 12 BC [1198]; on 12 BC [1072]; see *Acer*.
- P. nivea* (Karst.) Bourd. & Galz.: on 11 BC [1198].
- P. polygonia* (Pers. ex Fr.) Bourd. & Galz. (*Corticium polygonium* Pers. ex Fr., *Cryptochaete p.* (Pers. ex Fr.) Karst.): white spongy rot, carie blanche spongieuse: on bark of *P. sp.* Man [93, p. 76]; from *P. sp.* Man F52:96; on dead 11 Alaska [555], Alta F58:82; from 11 Alta [1071], Man 48:11, Ont F52:70, [56; cf. 316]; on 11, 12 BC [1198]; from 11, 12 Alta F57:71.
- P. populnea* (Pk.) Burt: on *P. sp.* Ont, 11 Man [705].
- P. pubera* (Fr.) Sacc.: on *P. sp.* NS [1138]; on old *P. sp.* Man [93, p. 78].
- P. rimicola* (Karst.) Höhn. & Litsch.: on bark of *P. sp.* Ont [497]; see *Acer*.
- P. rufa* (Fr.) Boid. (*Stereum rufum* Fr. [*Sterellum r.* (Fr.) John Erikss.]): on *P. spp.*, common, NS PEI [1138], Sask Man, abundant on dead branches [93, p. 78]; on 11 Alaska [555], NB Nfld F53:26; on 11, 12 BC [1198]; from 11 Alta Man 48:100; from 12 BC [1072].
- P. sambuci* (Pers.) Burt: on 12 BC [1072, 1198]; see *Acer*.
- P. sanguinea* (Fr.) Höhn. & Litsch.: on 11 BC [1198].
- P. velutina* (Fr.) Cke.: on bark and wood of *P. sp.* Man [93, p. 78].
- Perichaena corticalis* (Batsch) Rost.: common on bark of *P. sp.* Man [93, p. 26].
- Pezicula ocellata* (Pers.) Seav. (*Ocellaria o.* (Fr.) Schroet.): on 11 Ont [235], NS [1138].
- Peziza repanda* Pers.: on 12 BC [1198].
- Pezizella ?viridiflavescens* Rehm: on old *P. sp.* Man [93, p. 41].
- Phaeosphaerella maculosa* (Sacc.) Karst.: on leaves of 11 BC [50].
- Phialocephala bactrospora* W.B.Kendr.: from 12 BC [552].
- Phialophora alba* van Beyma: from 11 Ont [56].
- Phlebia radiata* Fr. (*P. merismoides* Fr.): on *P. sp.* Que [795]; on 11, 12 BC [1198]; on 12 BC [1072].
- P. strigosozonata* (Schw.) Lloyd (*Phacophlebia s.* (Schw.) W.B.Cke.): white spongy rot, carie blanche spongieuse: on fallen *P. sp.* Man [93, p. 80]; on felled timber of *P. spp.* Ont [316]; on *P. sp.* NS

- [1138]; from 11 Alta F58:82, [1071], Alta Sask Man 48:100, NB NS F53:25; on 11, 12 BC [1198]; on 12 BC [1072].
- Pholiota aurivella* (Batsch ex Fr.) Kummer (*P. adiposa* auct. Am.): brown mottled rot, carie brune madrée: from *P. spp.* Ont [316]; from 11 Alta [1071], Man 48:100, Ont F51:131, [56].
- P. destruens* (Brond.) Quél.: yellow laminated butt rot, carie jaune laminée du pied: from *P. sp.* Sask F53:108, Ont [316]; from 4 Alta F58:82, [1071]; on or from 12 BC F52:149, [1198]; dominant cause of decay of living and dead 12 BC [1072].
- P. mutabilis* (Schaeff. ex Fr.) Quél. [*Kuehneromyces m.* (Schaeff. ex Fr.) Singer & Sm.]: on 12 BC [1072, 1198].
- P. spectabilis* (Weinm. ex Fr.) Quél.: brown mottled rot, carie brune madrée: from *P. sp.* Sask Man F53:106, Ont [316]; from 4 Alta [1071]; from 4, 11 Alta F58:82; from 11 Ont F51:131, [56]; from 11, 12 BC [1198]; from 12 BC [1072].
- P. squarrosa* (Pers. ex Fr.) Kummer: brown mottled rot, carie brune madrée: from 11, 12 Alta F57:71.
- P. squarrosoides* Pk.: on stump and logs of *P. sp.* Man [93, p. 105].
- P. subsquarrosa* (Fr.) Quél.: from 11 Alta [1071].
- Phyllosticta alcides* Sacc.: on *P. sp.* Alaska [175].
- P. brunnea* Dearn. & Barth.: canker, chancre phyllostictéen: on 4 Man and probably 11 Sask [93, p. 135]; on 11 Ont 44:101; on ?11 Sask F54:98.
- P. intermixta* Seav.: on *P. sp.* Alaska [175], Man [93, p. 135].
- P. osteospora* Sacc.: on 12 Alaska [175].
- Physarum auriscalpium* Cke.: on old *P. sp.* Man [93, p. 26].
- P. bitectum* Lister: on bark of *P. sp.* Man [93, p. 27].
- P. contextum* Pers. and *P. globuliferum* (Bull.) Pers.: on *P. sp.* Man [93].
- P. notabile* Macbr., *P. nutans* Pers. and *P. oblatum* Macbr.: on old *P. sp.* Man [93].
- P. viride* (Bull.) Pers.: on *P. sp.* Man [93].
- Pistillaria ?clavulata* Ell.: on leaves of 4 Man [93, p. 29].
- Plagiostoma populi* Cash & Waterm.: on \times *P. spp.* Ont F59:65; on 11, 1 \times 8 Que F59:42.
- Platyglœa peniophorae* Bourd. & Galz.: on *P. sp.* Ont. [673].
- Pleurophomella spermatiospora* Höhn.: on *P. sp.* Alta F63:105, NS [1138]; on 11 NB F62:37.
- Pleurotus albolanatus* Pk.: on 12 BC [1072, 1198].
- P. craspedius* Fr.: on old *P. sp.* Man [93, p. 93].
- P. lignatilis* (Pers. ex Fr.) Gill.: on 12 BC [1072, 1198].
- P. ostreatus* (Jacq. ex Fr.) Kummer: white spongy rot, carie blanche spongieuse: on *P. sp.* Mack Yukon [88], Sask Man F52:96, [93, p. 94], NS, rather common [1138]; on 11 Alaska [175, 555]; from 11 BC [1198], Ont [56]; on 11 Alta F61:105; on 12 BC [1072, 1198].
- P. ?pulmonarius* Fr.: on old *P. sp.* Man [93, p. 94].
- P. salignus* (Fr.) Quél.: on *P. spp.* NS [1138].
- P. sapidus* Kalchbr.: on 12 BC [1198].
- P. subareolatus* Pk.: white spongy rot, carie blanche spongieuse: from 11 Ont F52:70, [316], NB F53:221; on 12 BC [1072, 1198].
- P. ulmarius* (Bull. ex Fr.) Kummer: white spongy rot, carie blanche spongieuse: on *P. sp.* Mack [88], NS [1138]; on 4 Alaska [175]; on 12 BC [1072, 1198].
- Pluteus cervinus* (Schaeff. ex Secr.) Kummer: on 12 BC [1198].
- Pollacia elegans* Serv. (*Fusicladium radiosum* (Lib.) Lind var. *balsamiferae* Davis; *F. radiosum*, *F. tremulae* and *Napicladium t.*, sensu lat.; stat. perf. *Venturia populina*, q.v.): shoot blight, brûlure des pousses: on 4 BC 34:75, Alta 53:108, F53:130, Sask F51:144, Ont F55:64, F58:59, Que F61:53; NS F54:25; on 12 Alaska [983, 1038], BC [1203], cf. 53:108, [478].
- P. radiosa* (Lib.) Bald. & Cif. (*Fusicladium radiosum* (Lib.) Lind, *Napicladium tremulae* (Frank) Sacc.; stat. perf. *Venturia tremulae*, q.v.): shoot blight, brûlure des pousses: on 3 Alta F63:105; on 8 Ont 34:76, F52:74, Que F58:35, NB 54:25, NS PEI 52:105; on 11 BC 44:101, [1198], Alta F53:130, Sask Man 34:76, [93, p. 119], Ont F52:74, Que F53:49, NB F52:19, NB NS PEI Nfld F54:25; prevalent on 8, 11 from Ont eastward; also recorded on *P. spp.* hybrids in Que, F58:35.
- Polyporus adustus* Willd. ex Fr.: white mottled rot, carie blanche madrée: on *P. sp.* NS [1138]; on 4 Alaska [175]; from 4, 11 Alta [1071], Man [93, p. 82]; on dead 11 Alaska [555]; from 11 Alta F58:82, Alta Sask Man 48:100, Ont [56, 316]; on 11, 12 BC [1198]; an important saprophyte of 12 BC [1072].
- P. albellus* Pk.: on *P. sp.* Man [93, p. 82]; on 11 Alaska [555].
- P. caesius* Schrad. ex Fr.: on 4 Alaska [175]; on 11, recorded on 12 BC [1198].
- P. cuticularis* Bull. ex Fr.: white stringy rot, carie blanche filandreuse: from 8 Ont [791].
- P. delectans* Pk.: white spongy rot, carie blanche spongieuse: on 12 BC F52:149, [1198]; the dominant cause of decay of both living and dead trees of 12 BC [1072].
- P. dichrous* Fr.: on 11, 12 BC [1198]; on 12 BC [1072].
- P. dryophilus* Berk. var. *vulpinus* (Fr.) Overh.: white pocket rot, carie blanche alvéolaire: on *P. sp.* NB [1138]; from *P. sp.*, 11 Ont [791]; on 8 Ont 36:69; from 11 Ont [316], NB F53:22; on 11 BC F53:22, [1198].
- P. elegans* Bull. ex Fr.: on 12 Alaska [1038], BC [1072, 1198].
- P. floriformis* Quél.: on dead *P. sp.* Man [93, p. 82].
- P. galactinus* Berk.: causes a white rot of broad-leaved trees; from *P. sp.* Que [791, 795]; on 12 BC [1198].
- P. glomeratus* Pk.: on fallen *P. sp.* Man [93, p. 83]; on 12 BC [1072, 1198].
- P. hirsutus* Wulf. ex Fr.: white spongy rot, carie blanche spongieuse: on or from 11 Alaska [555], Alta Sask 48:100, Man, common [93, p. 83], NB Nfld F53:26; on 12 BC [1072, 1198].
- P. melanopus* Fr.: on 12 BC [1072, 1198].
- P. nidulans* Fr. (*P. rutilans* Pers. ex Fr.): on 12 BC [1072].
- P. obtusus* Berk.: white spongy rot, carie blanche spongieuse: on 8 Ont F53:85.
- P. pargamenus* Fr.: white spongy rot, carie blanche spongieuse: from *P. sp.*, 11 Ont [791, 795]; on 4, 8 and especially 11 Ont F55:62; on 4, 11 Alaska [555], Sask Man [93, p. 83]; on 4 Yukon F63:125; on 11, 12 BC [1198]; on 12 BC [1072].
- P. picipes* Fr.: on 11, 12 BC [1198]; on 12 Alaska [555], BC [1072].
- P. pubescens* Schum. ex Fr.: white spongy rot, carie blanche spongieuse: on 11 Alaska [555], Mar 48:100; on 12 BC [1072].
- P. semipileatus* Pk.: on *P. sp.* Man [93, p. 83]; on 11 BC [1198].
- P. spumeus* Fr.: recorded on *P. sp.* NS [1138].

Populus

- Polyporus squamosus* Mich. ex Fr.: white mottled rot, carie blanche madrée: on 12 BC [1072, 1198].
- P. subchartaceus* (Murr.) Overh.: fairly common on *P. sp.* Man [93, p. 83]; on 11 BC Yukon F62:122; on 12 BC [1072, 1198].
- P. sulphureus* Bull. ex Fr.: on 6 Alaska [175].
- P. tulipiferae* (Schw.) Overh. (*Irpex t.* Schw.): white spongy rot, carie blanche spongieuse: on *P. spp.* NS [1138]; from *P. sp.* Ont [295]; from 11 Ont [56]; on 12 BC [1072, 1198].
- P. velutinus* Fr. (*P. zonatus* Nees ex Fr.): white spongy rot, carie blanche spongieuse: on *P. sp.* Man, 11 Sask [93, p. 84]; on *P. sp.* NS [1138]; on or from 11 Alaska [175, 555], BC [1198, 1199], Alta [1071], Man 48:100, NS [1138]; from 11 Alta F58:82; on 4, 11 Yukon F63:125; from trees injured in an ice storm NB F58:26.
- P. versicolor* L. ex Fr.: on 11 BC [1072, 1198]; from 11 Sask Man 48:100, Ont [56, 295]; on 12 Alaska [175, 555], BC [1072, 1198].
- Poria ambigua* Bres.: on *P. sp.* Man [93, p. 84], NS [1138]; on 4 Alta 48:100.
- P. aneirina* (Sommerf.) Cke.: on 4 Alaska [175]; on 11, 12 BC [1198]; on 12 BC [1072].
- P. cocos* (Schw.) Wolf: on log of *P. sp.* Ont [315]; from *P. sp.* Ont [316].
- P. corticola* (Fr.) Cke.: rather common on *P. sp.* Man [93, p. 84], NS [1138]; on 11, 12 BC [1198]; on 12 BC [1072].
- P. eupora* (Karst.) Cke.: on *P. sp.* Man [93, p. 84], Que [795]; on 11, 12 BC [1198].
- P. ferrea* (Pers.) Bourd. & Galz.: on 12 BC [1072, 1198].
- P. ferruginosa* (Schrad. ex Fr.) Karst.: on 11, 12 BC [1198]; on 12 BC [1072].
- P. laevigata* (Fr.) Karst.: on 4, 11 Alta F59:92.
- P. obliqua* (Pers. ex Fr.) Karst.: on 12 BC [1072, 1198].
- P. pannocincta* (Rom.) Lowe: white spongy rot, carie blanche spongieuse: on 12 BC F57:85, [1199].
- P. punctata* (Fr.) Karst.: on *P. sp.* Man [93, p. 84].
- P. purpurea* (Fr.) Cke.: on old *P. sp.* Man [93]; on 11 BC [1198].
- P. reticulata* (Pers. ex Fr.) Cke.: on decayed log of *P. sp.* Man [93].
- P. rhodella* (Fr.) Bres. (*P. griseo-alba* (Pk.) Sacc.): on bark of ?*P. sp.* Man [93]; on 12 BC [1072, 1198].
- P. tarda* (Berk.) Cke. (*P. semitincta* (Pk.) Cke.): on wood of *P. sp.* Man [93, p. 85].
- P. versipora* Pers. ex Fr.: on dead *P. sp.* Man [93].
- P. viridans* (Berk. & Br.) Cke. (*P. borealis* Overh. sp. inedit.): on bark of *P. sp.* Man [93, p. 84].
- P. xantha* (Fr. ex Lind) Cke.: on *P. sp.* NS [1138]; on 12 BC [1072, 1198].
- Porothelium fimbriatum* Pers. ex Fr.: on *P. sp.* Man Ont [93, p. 76], NS [1138].
- Propolis faginea* (Schrad.) Karst.: common on wood of *P. sp.* Man [93, p. 42]; on 11 NS [1138].
- Protodontia oligacantha* G. W. Martin: on 12 BC F52:151, [1198].
- ?*Pseudomonas syringae* van Hall: twig blight, brûlure des rameaux: on *P. sp.* Sask 51:107.
- Psilocybe conissans* Pk.: on *P. sp.* NS [1138].
- Pycnoporus cinnabarinus* (Jacq. ex Fr.) Karst. (*Polyporus c.* Jacq. ex Fr.): on *P. sp.* Man [93, p. 82], Ont [794]; on 11 NS F53:25; for cultural studies, see [794].
- Radulum casearum* (Morgan) Lloyd: white spongy rot, carie blanche spongieuse: on *P. sp.* Man [93, p. 80]; from *P. spp.* Sask Man F53:106, Ont [316]; from 11 Alta F55:91, [1071], Sask Man F56:71, Sask [795], Ont F51:13, F53:84, [56], NB F53:22; on 11, 12 BC [1198]; from 11, 12 Alta F57:71.
- R. spathulatum* (Fr.) Bres.: on old *P. sp.* Man [93, p. 80].
- Rosellinia parasitica* Ell. & Ev.: on old *P. sp.* Man [93, p. 51].
- R. pulvuracea* (Ehrh.) Fckl.: on old 11 Sask Man [93], Sask 30:82.
- Saccoblastia pinicola* Bourd. & Galz.: on fallen *P. sp.* Man [93, p. 74].
- Schizophyllum commune* Fr.: white spongy rot, carie blanche spongieuse: on *P. sp.* Sask Man [93, p. 95]; on 11 BC [1198]; the structure and process of division of the nuclei in the vegetative mycelium are described [47].
- Sclerotium compactum* Tode: on fallen leaves of *P. sp.* Man [93, p. 126].
- "*S. confundens* Whetz.": on 11 Alta F53:131; cf. *Ciborinia seaveri*.
- Scutellinia scutellata* (L. ex Fr.) Lambotte (*Patella s.* (L. ex Fr.) Morgan): on 12 BC [1198].
- Sebacina adusta* Burt: on 12 BC [1198].
- S. calcea* (Pers.) Bres.: on 4 Sask [93, p. 74].
- S. eyrei* Wakef. [*Basidioidendron e.* (Wakef.) Luck-Allen]: on 12 BC [1198].
- Septogloeum rhopaloides* Dearn. & Bisby (stat. perf. *Guignardia populi* G.E.Thompson [1073, p. 658]): leaf blight, brûlure des feuilles: common on 11 Man [93, p. 131]; on 11 Yukon F63:125, Ont F63:71, [1073], NB F63:37; on 8 NS 53:109.
- Septoria musiva* Pk. (stat. perf. *Mycosphaerella populorum*, q.v.): leaf spot, tache des feuilles: on 4 Alta F60:91, Sask 29:64, F54:98, on \times *P. spp.*, 4 Man [93, p. 139]; on 11 NB 56:120, F56:25, NS 52:105; on 12 Alaska [1038], BC F63:125; known from Alta Sask Man Ont Que [1076].
- S. populicola* Pk. (stat. perf. *Mycosphaerella p.*, q.v.): leaf spot, tache des feuilles: on *P. sp.* Alta 42:95; on 3 Sask, 4 Sask Man [93, p. 139]; on 4 Alta F63:105, Ont 31:86, Que 45:104, NB F56:26; on 12 BC 41:84, [cf. 1076].
- Septotinia populiperda* Waterm. & Cash: on \times *P. spp.* Que F58:36.
- Solenia ochracea* Hoffm. ex Fr.: on 12 BC [1207].
- Steccherinum ochraceum* (Fr.) S.F. Gray: on wood of *P. sp.* Man [93, p. 81]; on 4 Alaska [175]; on 12 BC [1198].
- S. septentrionale* (Fr.) Banker: on 11 Alta F62:102.
- Stereum bicolor* (Pers. ex Fr.) Fr. (*S. fuscum* Schrad. ex Qué.): on *P. sp.* Man [93, p. 78]; see *Betula*.
- S. cinerascens* (Schw.) Masee: on *P. sp.* Man [93, p. 78]; see *Acer*.
- S. hirsutum* (Willd. ex Fr.) S.F.Gray: causes a white rot of old logs of 11 Alaska [555].
- S. murrayi* (Berk. & Curt.) Burt: from living *P. sp.* Ont [316]; from 11 Ont [56].
- S. ostrea* Blume & Nees ex Fr. (*S. fasciatum* Schw.): on *P. sp.* Man Ont [93, p. 78]; on 12 BC [1072].
- S. purpureum* (Pers. ex Fr.) Fr.: silver leaf, plomb: on *P. sp.* Man [93, p. 78], NB, common on young trees injured in an ice storm in 1956, F58:26; on 4 Alaska [175]; from 4 Alta [1071]; from 4, 11 Alta F58:82; on 9a BC F57:87, [1199]; from 11 Ont [56]; on 11 NB Nfld F53:26; on 11, 12 BC [1198]; on dead 12 Alaska [555]; an important saprophyte in BC [1072].
- Stictis curtispora* Dearn. & Bisby: on dead branches of 11 Man [93, p. 42].
- S. mollis* Pers.: on ?*P. sp.* Man [93].

Stictis radiata (L.) Pers.: on twigs of *P. sp.* Man [93].
Stigmina populi (Ell. & Ev.) Pound & Clements: on 4 NS 53:109; on 11 Alaska [175].
Strickeria obducens (Fr.) Wint. (*Teichospora o.* (Fr.) Fckl.): on bark and wood of *P. sp.* Man [93, p. 52].
Taphrina aurea Fr.: probably does not occur in Canada: see records below.
T. johansonii Sadeb.: catkin blister, cloque de chatons: on *P. sp.* Ont 25:67; on 8, 11 Que F58:36; on 11 Que 35:63, F53:49.
T. populina Fr.: leaf blister, cloque des feuilles: on *P. sp.* NS 56:120; on 5a Ont 57:119; on 9a BC F58:101, [1203], BC Que [735], Que F58:36, NS Nfld F56:26; as *T. aurea* on 9a Que 38:100, PEI 36:69, [1138]; on \times *P. sp.* BC F59:110.
T. populi-salicis Mix: leaf blister, cloque des feuilles: on 12 Alaska [983, 1038], BC 53:109, [735, 1198]; as *T. aurea* on 12 BC 38:93.
Teichospora fulgyrata Ell. & Ev.: on decorticated branches of *P. sp.* Man [93, p. 52].
T. populina Ell. & Ev.: on decorticated *P. sp.* Man [93].
T. pruniformis (Nyl.) Karst.: on branches of 11 Man [93].
Tomentella coriaria (Pk.) Bourd. & Galz. (*Hypochnus coriarius* (Pk.) Burt): on *P. spp.* Man [93, p. 77]; on 12 BC [1198].
T. echinospora (Ell.) Bourd. & Galz. (*Hypochnus echinosporus* (Ell.) Burt): on *P. spp.* Man [93].
T. ferruginea Pers. (*Hypochnus ferrugineus* (Pers.) Fr.): on old *P. sp.* Man [93].
T. ferruginosa (Höhn. & Litsch.) Sacc. & Trott. (*Hypochnus canadensis* Burt): on old *P. spp.* Man [93, p. 160].
T. fusca (Pers.) Schroet.: on 12 BC [1198].
T. pallidofulva (Pk.) Litsch. (*Hypochnus pallidofulvus* (Pk.) Burt): on decayed *P. spp.* Man [93, p. 77].
T. pannosa (Berk. & Curt.) Bourd. & Galz. (*Hypochnus pannosus* (Berk. & Curt.) Burt): on decayed *P. spp.* Man [93]; on 12 BC [1198].
T. pilosa (Burt) Bourd. & Galz. (*Hypochnus pilosus* Burt): on decayed ?*P. sp.* Man [93].
T. rubiginosa (Bres.) R.Maire (*Hypochnus rubiginosus* Bres.): on decayed ?*P. sp.* Man [93].
T. tristis (Fr.) Litsch. & Höhn. (*Hypochnus umbrinus* (Fr.) Qué.) on old *P. spp.* Man [93].
Trametes hispida Bagl.: on old deciduous wood probably mostly *P. sp.* Man, on 4, 11 Sask [93, p. 85]; on *P. sp.* NS [1138]; on 11, 12 BC [1198]; on 11 Alta F54:111; on 12 BC [1072].
T. mollis (Sommerf.) Fr.: on 12 BC [1072, 1198].
T. suaveolens (L. ex Fr.) Fr.: on dead trees and logs of 4, 11 Alaska [555]; on 4 Alta F59:92; on 11 Yukon F63:125; on 12 BC [1198].
T. tenuis Karst.: from 12 BC [1072, 1198].
T. trogii Berk.: on dead *P. sp.* NS F53:27; from 4 Alta [1071]; on dead deciduous tree Man [93, p. 85].
Trechispora brinkmanni (Bres.) Rogers & Jacks. (*Grandidinia b.* (Bres.) Bourd. & Galz.): white stringy rot, carie blanche filandreuse: on old *P. sp.* Man [93, p. 80]; from 11 Ont [56]; from 12 BC [1072, 1198]; see *Abies*.
T. raduloides (Karst.) Rogers: red heart rot, carie rouge du cœur: from *P. sp.* Ont, 12 BC [674]; from 4, 11 Alta [1071]; from 11 Ont F52:70, [56]; on 11, 12 BC [1198]; a conidium-bearing species [674]; see *Abies*.
Tremella viscosa Berk.: on fallen *P. sp.* Man [93, p. 74].

Trichia contorta (Ditmar) Rost.: on *P. sp.*, etc., Man [93, p. 27].
T. inconspicua Rost.: on bark of *P. sp.* Man [93].
T. varia Pers.: reported on 8 NS [1138]; not uncommon in Man [93].
Trichocladium canadense Hughes: from decayed 11 NB [483].
Trimmatostroma americanum Thüm.: on *P. sp.* Man [93, p. 128].
Tuber candidum Harkn.: beneath bark on a fallen log of ?*P. sp.* Man [93, p. 44].
Tympanis spermatiospora (Nyl.) Nyl. (stat. conid. *Pleurophomella s.*, q.v.): on *P. spp.* BC Man Ont Que NS [372], Man [93, p. 42], NS [1138]; Nfld F53:27; on 11 Que F60:44; on 12 BC [1198].
Typhula filiformis Bull. ex Fr.: on fallen leaves of *P. sp.*, etc., Man [93, p. 79].
Uncinula salicis (DC. ex Méral) Wint.: powdery mildew, blanc: widespread on *P. spp.*; on 3 Sask 35:12; on 3, 4 Sask Man [93, p. 45]; on 4 Alta 33:63; on 4, 11 Alta F54:11, Ont F52:75; on 4, 12 Alta F51:144; on 4, 8, 11 Que F58:36; on 8 Que 45:104, NS 53:109; on 11, 12 BC 40:87; on 11 Yukon F62:122; on 12 Alaska [175], BC [1198].
Valsa nivea (Hoffm.) Fr.: canker, chancre cytosporéen: on *P. sp.* BC [50]; on 4, 8, reported on 11 NS [1138]; on 4 Sask, 11 Man [93, p. 58]; on 8 Ont F59:65; on 11 Que F58:36, on ?11 Sask F54:98.
V. nivea f. *tetraspora* Sacc.: on 11 NB F53:27, [cf. 93, p. 58 sub *V. nivea*].
V. salicina (Pers.) Fr.: on *P. sp.* NS [1138].
V. sordida Nit. (stat. conid. *Cytospora chrysosperma*, q.v.): on *P. sp.* Sask F52:96; on *P. spp.* NS [1138]; on 4 Alaska [175]; on 4, 6, 8, 11 Que, general, F58:36.
Valsaria exasperans (Gerard) Ell. & Ev.: on \times *P. spp.* Ont F59:65.
V. insitiva (Tode) Ces. & de Not.: on branches of *P. sp.* Man [93, p. 58].
Venturia macularis (Fr.) Müll. & Arx: (*Phaeosphaerella m.* (Fr.) Trav.): on 11 Que [53]; on leaves of 11 NS [1138].
V. populina (Vuill.) Fabric. (*Didymosphaeria p.* Vuill.: stat. conid. *Pollacia elegans*, q.v.): on 4 Ont F53:85, F57:51, Que F58:35; perfect state on 4 Ont Que, and the imperfect state on 4 BC Alta Ont Que [233]; the perfect state on 4 Yukon F61:125.
V. tremulae Aderh. (stat. conid. *Pollacia radiosa*, q.v.): on 11 Ont; conidial state on 8, 11 Ont [232; cf. 234].
Zignoella pulviscula (Currey) Sacc.: on *P. sp.* Man [93, p. 51].

Portulaca L.

PORTULACACEAE

Fleshy herbs of tropical and warm regions.

1. *P. grandiflora* Hook., rose-moss, chevalier d'onze heures; introduced from S. America; persists in flower gardens.
2. *P. oleracea* L., purslane, pourpier sauvage; naturalized from Europe; a widely distributed weed in Canada.

Albugo quadrata (Wallr.) S.D.Baker (*A. portulacae* (DC.) Ktze., *Cystopus p.* (DC.) Lév.): white rust, albugine: on 2 Sask Man Ont Que [970], Sask Man [93, p. 29], NB 30:98, NS 29:77, NB NS [1138].

Portulaca

Fusarium spp.: wilt, flétrissure fusarienne: on 1 BC 43:114; the disease caused a 10 percent loss of plants grown for seed BC 48:112.

F. equiseti (Cda.) Sacc.: from seed of 1 Sask [335].

Helminthosporium portulacae Rader: leaf and stem blight, brûlure helminthosporienne: on 1 Ont Que 49:109, Ont 57:129; on 2 Sask Que 49:109, [cf. 970]; undoubtedly the fungus is a *Bipolaris*.

Potamogeton L.

ZOSTERACEAE

Herbs of ponds and streams of wide distribution but most abundant in north temperate regions.

1. *P. epihydrus* Raf. var. *nuttallii* (Cham. & Schlecht.) Fern.; Nfld, NS and Labr to Man and Alaska.
2. *P. gramineus* L. (*P. heterophyllus* auct.); Nfld and NS to Alaska.
3. *P. natans* L.; Greenl, Nfld and NS to Alaska.
4. *P. nodosus* Poir. (*P. americanus* C. & S.); in Canada in NB, Que, Ont and BC.
5. *P. pusillus* L.; Que to Alta, BC, Yukon and Alaska.
6. *P. richardsonii* (Bennett) Rydb.; Labr and Que to Alaska.
7. *P. vaseyi* Robbins; in Canada in NB, Que and Ont.

Doassansia martianoffiana (Thüm.) Schroet.: on 1 Alaska, 4 Ont [953]; on 1 Ont, 2 Man, 3 Man Ont, 4 Ont [292]; on 2, 3 Man [93, p. 60]; on 3 Alaska BC Man [957].

D. occulta (Hoffm.) Cornu: on 3, 5, 7 Ont, 6 Canada [292].

Potentilla L.

ROSACEAE

Herbs or rarely shrubs mostly of the northern hemisphere.

1. *P. anglica* Laicharding (*P. procumbens* Sibth.); in Canada in Labr, Nfld and NS.
2. *P. anserina* L., silver weed, argentine; Nfld, NS and NB to Alaska and Eurasia; apparently introduced in E. Canada.
3. *P. biflora* Willd.; from Mack to Alaska and e. Asia.
4. *P. canadensis* L., five-fingered jack; in Canada from NS to Ont.
5. *P. concinna* Richards.; in Canada from Man to Alta.
6. *P. crantzii* (Crantz) G. Beck (*P. maculata* E.Mey.); arctic N. America to Nfld and Que.
7. *P. diversifolia* Lehm. (*P. glaucophylla* Lehm.); BC, Alta and Sask to Colo and Calif.

8. *P. elegans* Cham. & Schlecht.; Mack to Alaska and Asia.

9. *P. fruticosa* L. (*Dasiphora f.* (L.) Rydb.), shrubby cinquefoil; Labr, Nfld and NS to Alaska and Calif.

10. *P. glomerata* Nels.; Wash and Mont to Calif.

11. *P. gracilis* Dougl. (*P. camporum* Rydb., *P. viridescens* Rydb.), cinquefoil; Man and Alta to Alaska, BC and Calif. 11a, *P. g.* var. *flabelliformis* (Lehm.) Nutt. (*P. f.* Lehm.); Sask and BC to Calif. 11b, *P. g.* var. *pulcherimma* (Lehm.) Fern. (*P. p.* Lehm.). 11c, *P. g.* var. *rigida* (Nutt.) Wats. (*P. nuttallii* Lehm.); Man to Alaska and BC.

12. *P. hippiana* Lehm.; in Canada from Man to Alta.

13. *P. hyperarctica* Malte (*P. emarginata* Pursh non Desf.); Greenl, Frank, Keew to Que and Labr.

14. *P. multifida* L.; Que, Man and Alta to Alaska.

15. *P. nivea* L.; Nfld and Que to Frank, Mack, Yukon, Alaska and Eurasia. 15a, *P. n.* var. *pinnatifida*.

16. *P. norvegica* L. (*P. monspeliensis* L., including *P. n.* var. *hirsuta* (Michx.) Lehm.), rough cinquefoil, potentille de Norvège; Greenl and Labr to Alaska and south; a common weed in all provinces.

17. *P. palustris* (L.) Scop., marsh cinquefoil, comaret; Greenl, Labr, Nfld and NS to Alaska and Calif.

18. *P. pensylvanica* L. (*P. strigosa* sensu Rydb.); Que to Man and Yukon. 18a, *P. p.* var. *bipinnatifida* (Dougl.) Torr. & Gray (*P. b.* Dougl.); in Canada from Que to Alta. 18b, *P. p.* var. *glabrata* (Hook.) Wats. (*P. glabrella* Rydb.); Ont to Alta. 18c, *P. p.* var. *pectinata* (Raf.) Lepage (*P. pectinata* Raf., *P. litoralis* Rydb.); Labr, Nfld and Que to Alaska.

19. *P. pulchella* R.Br.; Greenl and Que to Yukon and Alaska.

20. *P. recta* L.; Nfld to Ont; naturalized from Europe.

21. *P. rubricaulis* Lehm. (*P. pedersenii* Rydb.); Mack and Frank.

22. *P. simplex* Michx. (*P. canadensis* var. *s.* (Michx.) Torr. & Gray), NS and NB to Ont.

23. *P. tridentata* Ait. (*Sibbaldiopsis t.* (Ait.) Rydb.), three-toothed cinquefoil; Greenl, Labr, Nfld and NS to Mack and Alta.

24. *P. vahliana* Lehm.; Frank and Alaska.

Other hosts: 25, *P. nivalis* Torr. 26, *P. pallida* Lag.

Botrytis cinerea Pers.: on *P. sp.* Alaska [175].
Chaetosphaeria byssiseda Rostr.: on 13 Frank [903].
C. potentillae Rostr.: on 15 Greenl [901, p. 65]; on 19 Greenl [602].
Coleroa potentillae (Fr.) Wint.: on *P. sp.* Alaska [175].
Coniothecium sp.: on *P. spp.* Yukon [600].
C. asperulum Dur. & Mont.: on 13, 24 Frank, 21 Greenl [903].
Diplodina lyngbei Lind: on 3 Alaska [175, 604].
Frommea obtusa (Strauss) Arth. (*Phragmidium potentillae-canadensis* Diet.): 0 I II III on *P. sp.* BC [1198]; on 4 Ont NS [15, p. 93]; on 4, 22 Ont [828]; on 4 NB NS PEI, 22 NS [1138]; on 4 NS 31:119.
Fusarium acuminatum Ell. & Ev.: from discolored basal parts of 16 Man [335].
Gnomonia fragariae Kleb.: on petioles of 17 BC [50].
Guignardia potentillae (Rostr.) Lindau: on leaves of 7 BC [50].
Laestadia potentillae Rostr.: on 6 Greenl [900, p. 615].
Laetinaevia arctica (Allesch.) Nannf. (*Orbilia a. Allesch.*): on 13 Frank [604].
Leptosphaeria doliolum (Fr.) de Not.: on 16 Que [53].
Leptosphaerulina pulchra (Wint.) Barr (*Pleospora oligasca* Bub.): on *P. spp.* BC [50]; on *P. sp.*, 15 Que, 6 Labr [52, p. 7].
Leptostroma potentillae (Fr.) Karst.: on 13 Greenl [899].
Leptothyrium arcticum (Fckl.) Lind: on 13 Canada [604], Greenl [603].
Leptotrochila repanda (Fr.) Karst. (*Mollisia dehnii* (Rabh.) Karst.): on 16 Alta 34:106; on 16 Sask Man, 18a Man [93, p. 41].
Marssonina potentillae (Desm.) Magn.: on 9 Man 44: 115.
Melanospora barbata (Fr.) Dur. & Mont.: on 19 Frank [52].
Mollisia atrata (Pers.) Karst.: on 6, 13 Greenl [901]; on 13 Greenl [601, 602, 603]; on 24 Yukon [600].
Mycosphaerella fragariae (Tul.) Lindau: on leaves of 17 BC [50].
M. ranunculi (Karst.) Lind: on *P. sp.* Que [52].
M. tassiana (de Not.) Johans. (*M. pachyasca* (Rostr.) Vesterg., *Sphaerella p.* Rostr.): on *P. spp.* BC [50]; on 6 Greenl [901]; on 8 Alaska, 13 Frank [604]; on 17 Yukon [250]; on 21 Greenl [603].
M. tassiana var. *arctica* (Rostr.) Barr: on *P. sp.*, 15 Que [52].
Peronospora potentillae de Bary: on *P. sp.* Alaska [175], PEI 31:123; on 11c BC [535]; on 16 Sask [93, p. 30], [cf. 1138].
Phoma potentillae Allesch.: on 13 Greenl [903].
Phragmidium andersonii Shear: 0 I II III on 9 Alaska [175], BC Alta Sask Ont NB [15, p. 80], Sask Man [93, p. 64], Ont Que [828], NB [1138]; heavy on hedge of 9 Man, also in Alta Sask Que 43:114.
P. fragariastris (Pers.) Karst.: on *P. sp.* NS 25:80; in the absence of a specimen, this is a doubtful record.
P. ivesiae Syd.: (0) I II III on 5 Alta 24:60, [15, p. 90]; on 7 Alta [15]; on 10 Alta 24:60, [15]; on 11 Alta 29:77, Sask 30:98; on 11a Alta 24:60, [15], Sask 30:98; on 11b Alta 29:77, Man [93]; on 11c BC [535], Alta [15], Sask [93, p. 64]; on 12 Sask [15]; on 16 Ont [828]; on 18a Man [93]; on 20 Ont [828]; a recent arrival in Ont.
P. potentillae (Pers.) Karst.: (0) I II III on *P. spp.* Alaska [175], BC [1198], Alta 34:107, NB 30:98; on *P. spp.*, 12, 18, 18a, 18b Alta-Man [93, p. 64]; on 1 NS [1138]; on 11c BC [1203]; on 12 Sask [15, p. 81]; on 18 Alaska [175], Alta Man 24:60,

81, Alta Sask Man [15]; on 18a Alta 24:60, Alta NWT [15], Man 33:119; on 18b Man 24:81, [15]; on 18c Que 34:107, [8], Nfld [15]; on 20, 26 Ont [828].
Phyllosticta potentillae Sacc.: on 23 Greenl [899].
Physalospora potentillae Rostr.: on dead stems and petioles of 6 Greenl [899, p. 548].
Pleosphaerulina vitrea (Rostr.) Berl. (*Pleospora v. Rostr.*): on 6 Greenl [900, p. 620], [cf. 604].
Pleospora androsaces Fckl. (*Pyrenophora a.* (Fckl.) Sacc.): on 14, 18a, 18c Man, 19, 21 Frank [604]; on 15 Greenl [603]; on 15a, 21 Greenl [602].
P. cerastii Oud. (*Pyrenophora c.* (Oud.) Lind): on 15 Greenl [603].
P. comata Auersw. & Niessl (*Pyrenophora c.* (Niessl) Sacc.): on *P. spp.* BC [50]; on 15 Greenl [603]; on 15, 19 Greenl [601]; on 19 Greenl [903].
P. helvetica Niessl: on *P. sp.*, 15, 24 Que, 6 Labr, 19 Frank [52].
P. herbarum (Fr.) Rabh.: on 6, 19 Greenl [899]; on 13, 19 Greenl [602]; on 13, 13 × 21, 21 Greenl [602]; on 15 Nfld [604]; on 19 Alaska [175, 250], Frank [52]; on 15 Greenl, 21 Frank [903].
P. moravica (Petr.) Wehm.: on 9 Que [53].
P. penicillus (Schw.) Fckl. var. *p.* (*Pyrenophora chrysospora* (Niessl) Sacc.): on 13 Greenl [603]; on 19 Greenl [601]; on 21 Greenl [602]; on 21, 24 Greenl [600].
P. phaeocomoides (Berk. & Br.) Wint. (*P. vulgaris* Niessl): on 6, 13 Greenl [899]; on 13 Frank Greenl [903].
Puccinastrum potentillae Kom.: II III on 23 Man Ont NB [15, p. 14]; Man 33:96, [93, p. 63]; Ont Que [828], Ont Que NS PEI Nfld [956], NB [1138].
Pyrenopeziza potentillae (Rostr.) Nannf. (*Trochila p. Rostr.*): on 13 Frank [604]; on 21 Greenl [903]; records of *Mollisia atrata* (q.v.) above may belong here.
Ramularia arvensis Sacc.: on *P. sp.* Alaska [1038]; on 2 Man 34:106; on 2, 16 Alaska [175], Man [93, p. 124]; on 16 Man 29:77.
R. punctiformis Sacc.: on 2, 16 Alaska [175].
Sclerotium durum Pers.: on 6 Greenl [901].
Selenophoma drabae (Fckl.) Petr. (*Septoria semilunaris* Johans.): on 15 Greenl [899].
Septogloeum potentillae Allesch.: ? on 17 Man [93, p. 131]; on 23 NS [956].
Septoria potentillae Thüm.: on 6 Greenl [899].
Sphaerotheca macularis (Wallr. ex Fr.) Lind (*S. humuli* (DC.) Burr.): on 13 Mack [605]; on 17 BC [50], NS [1138]; on 24 Man 43:114.
Synchytrium sp.: on 22 Ont [541].
Ustacystis waldsteiniae (Pk.) Zundel: on *P. sp.* Sask [292]; is the host not *Geum*?

Prenanthes L.

COMPOSITAE

Perennial herbs of N. America and Eurasia.

1. *P. alata* (Hook.) D.Dietr. (*Nabalus hastatus* (Less.) Heller); Alaska to Oregon.
2. *P. alba* L.; in Canada from Que to Sask.
3. *P. altissima* L., bird-bell; in Canada in NS and from Que to Man.
4. *P. racemosa* Michx.; in Canada from NS and Que to Ont and Alta.

Prenanthes

5. *P. trifoliata* (Cass.) Fern., gall-of-the-earth, patte d'oie; in Canada in Nfld and from NS to Ont.

Ceratobasidium anceps (Bres. & Syd.) Jackson: on *P. sp.* Que [495].

Puccinia dioicae P. Magn. (*P. extensicola* Plowr. var. *hieraciata* Arth.): 0 I on 2 Man, 4 Sask [93, p. 68]; on 22 Ont [828], [cf. 15, p. 109].

P. insperata Jackson: III on 1 Alaska [15, p. 351; 175].

P. orbicula Pk. & Clint.: 0 I II III on *P. sp.*, 2, 3 Ont [828]; on *P. sp.* Ont, 3 NS, 4 Sask, 5 Que [15, p. 355]; on *P. sp.*, 2, 5 NS, 3 NS PEI [1138]; on 2 Ont 31:123; on 3 PEI 25:80; on 4 Sask [93, p. 70].

P. prenanthis (Pers.) Fekl.: on 1 Alaska (*P. ?insperata*) [175].

Septoria nabali Berk. & Curt.: on 2 Man [175, p. 139].

Sphaerotheca fuliginea (Schlecht. ex Fr.) Poll. (*S. macularis* (Wallr. ex Fr.) Lind var. *f.* (Fr.) W.B.Cke., *S. humuli* (DC.) Burr. var. *f.* (Schlecht.) Salm.): on *P. sp.* Alaska [175]; on 2 Que 32:106; on 3 Que 34:107, [8], NS [1138].

Primula L.

PRIMULACEAE

Low mostly boreal or alpine perennial herbs, almost confined to the northern hemisphere.

1. *P. borealis* Duby; Mack, Yukon, Alaska and Asia.
2. *P. egaliksensis* Wormsk., Greenland primrose, primevère du Groënland; Greenl, Labr, Nfld, Que and Ont to Alaska, Alta and BC.
3. *P. mistassinica* Michx., bird's-eye primrose; Labr, Nfld, and NS to Alaska.
4. *P. polyantha* Mill.; probably a hybrid of European species; a hardy spring-flowering plant; widely cult.
5. *P. sibirica* Jacq.; Yukon, Alaska and Eurasia.
6. *P. stricta* Hoffm.; Alaska, Yukon, Frank to Man, Que, Labr and Greenl.

Botrytis cinerea Pers.: gray mold, moisissure grise: on *P. sp.* Alaska [175], NS 30:90.

Cercospora primulae Allesch.: leaf spot, tache foliaire: on *P. sp.* BC [535].

Mycosphaerella tassiana (de Not.) Johans. (*Sphaerella pachyasca* Rostr.): on 2 Greenl [900].

Phoma herbarum West.: on 2 Greenl [900].

Pleospora helvetica Niessl: on 6 Que [52].

P. herbarum (Fr.) Rabh. (*P. armeriae* (Cda.) Ces. & de Not.): on *P. sp.* BC [50]; on 1 Alaska [175, 604]; on 2 Greenl [900].

P. phaeocomoides (Berk. & Br.) Wint. (*Pyrenophora p.* (Berk. & Br.) Sacc.): on 5 Hudson Bay [604].

P. tragacanthae Rabh.: on *P. sp.* Labr [52].

Pseudomonas primulae (Ark & Gardner) Starr & Burkh.: bacterial leaf spot, tache bactérienne: on 4 BC 40:96.

Ramularia primulae Thüm.: leaf spot, tache foliaire: on *P. sp.* BC, common [535].

Synchytrium sp.: on 3 BC [541].

Virus: yellows, jaunisse: on 4 NB 35:71.

Prunella L.

LABIATAE

Low nearly cosmopolitan perennials.

1. *P. vulgaris* L., heal-all, brunelle; naturalized from Eurasia from Nfld to BC. 1a, *P. v.* var. *lanceolata* (Bart.) Fern., from Nfld and NS to Alaska and e. Asia.

Ceratobasidium anceps (Bres. & Syd.) Jackson: on 1 Ont [495].

Ceuthocarpum brunellae (Ell. & Ev.) Berl. (*Linosporea b.* Ell. & Ev.): on living leaves of 1 BC [50, 535].

Gibberidea abundans (Dobr.) Shear (*Naumovia a.* Dobr.): on 1 Ont [988, p. 359], NS [1138].

Ophiobolus rostrupii Ferd. & Winge: on *P. sp.* Alaska [175].

Septoria brunellae Ell. & Holw.: on 1 Man [93, p. 137].

Sphaerotheca fuliginea (Schlecht. ex Fr.) Poll. (*S. humuli* (DC.) Burr. var. *f.* (Schlecht.) Salm.): on 1 NS [1138].

Prunus L.

ROSACEAE

Small trees or shrubs mostly in the temperate zone of the northern hemisphere and a few in the Andes of S. America; cult. for their edible fruits and also for ornament. There are numerous cultivars. The species are arranged under their respective subgenera.

A. PRUNOPHORA Focke, apricot and plum.

1. *P. americana* Marsh., wild plum, prunier sauvage; in Canada from s. Ont. to s. Man.
2. *P. armeniaca* L., apricot, abricotier; w. Asia; cult.
3. *P. cerasifera* Ehrh., cherry plum, cerisette; w. Asia and Caucasus. 3a, *P. c.* var. *atropurpurea* Jaeg. (*P. pissardii* Carr).
4. *P. domestica* L., common plum, prunier de l'Islet; Europe and w. Asia; long cult. and escaped in e. US and NS.
5. *P. insititia* L. (*P. domestica* var. *i.* (L.) Bailey), damson plum, créquier; long cult. and more or less naturalized in e. US and NS.
6. *P. nigra* Ait., Canada plum, prunier sauvage; in Canada from Que to Man and introduced into NS.
7. *P. salicina* Lindl. (*P. triflora* Roxb.), Japanese plum, prunier de Chine; China; cult. in Japan and more recently in N. America.
8. *P. spinosa* L., blackthorn or sloe, prunellier; about the e. Mediterranean; long cult. and escaped in e. US and NS.
9. *P. subcordata* Benth., Ore to Calif.

B. AMYGDALUS (L.) Focke, almond, peach and nectarine.

10. *P. amygdalus* Batsch, almond, amandier; w. Asia; cult.

11. *P. glandulosa* Thunb. (*P. japonica* auct.), dwarf flowering almond; China, Japan.
 12. *P. japonica* Thunb., Japanese cherry tree, prunier du Japon; e. Asia.
 13. *P. persica* (L.) Batsch, peach, pêcher; China; spread from cult. in e. US. 13a, *P. p. f. atropurpurea* Schneid. 13b, *P. p. var. nectarina* (Ait.) Maxim.; nectarine, nectarine.
 14. *P. tenella* Batsch (*P. nana* Stokes non Du Roi), dwarf Russian almond; Eurasia.
 15. *P. triloba* Lindl., flowering almond; China.
C. CERASUS Pers., fasciculate cherries.
 16. *P. avium* L., sweet cherry, cerisier de France; Europe and w. Asia; long cult. and escaped in Canada from NS to s. Ont.
 17. *P. besseyi* Bailey; in Canada in Man and Sask.
 18. *P. cerasus* L., sour cherry, cerisier; w. Asia; cult. and escaped in Canada from PEI to Ont.
 19. *P. emarginata* (Dougl.) D.Dietr., bitter cherry, cerisier amer; BC to Ore and Calif.
 20. *P. fruticosa* Pall., ground cherry; Europe to Siberia.
 21. *P. mahaleb* L., mahaleb cherry, bois de Sainte-Lucie; Europe and w. Asia; long cult. and escaped in Canada in s. Ont.
 22. *P. pensylvanica* L.f., pin cherry, merisier; in Canada from Labr, Nfld and NS to BC.
 23. *P. pumila* L., sand cherry, ragouminier; in Canada in Ont and Que. 23a, *P. p. var. depressa* (Pursh) Bean (*P. d.* Pursh); in Canada from NB to Ont. 23b, *P. p. var. susquehanae* (Willd.) Jaeg. (*P. s.* Willd.); in Canada from Que to Man.
 24. *P. serrulata* Lindl., oriental flowering cherry; e. Asia.
 25. *P. subhirtella* Miq.; Japan. 25a, *P. s. var. pendula* (Maxim.) Tanaka; Japan.
 26. *P. tomentosa* Thunb.; e. Asia.
D. PADUS (Moench) Koehne, racemose cherries.
 27. *P. padus* L., European bird cherry, merisier à grappes; Eurasia. 27a, *P. p. var. commutata* Dipp., May-day tree; e. Asia.
 28. *P. serotina* Ehrh. (*Padus nana* (Du Roi) Roem.), black cherry, cerisier d'automne; in Canada from NS to s. Ont; the wood is excellent for cabinetwork and was so used in colonial times.
 29. *P. virginiana* L., choke cherry, cerisier à grappes; Nfld and NS to Alaska. 29a, *P. v. var. demissa* (Nutt.) Torrey (*P. d.* (Nutt.) D.Dietr.); BC to Wash and Calif. 29b, *P. v. var. melanocarpa* (A. Nels.) Sarg. (*P. m.* (A. Nels.) Rydb.); in Canada from Man to BC.
 - E. LAUROCERASUS Koehne, cherry laurel.
 30. *P. laurocerasus* L., cherry laurel, laurier-cerise; s.e. Europe and Asia Minor.
- Agrobacterium tumefaciens* (Sm. & Towns.) Conn (*Pseudomonas t.* (Sm. & Towns.) Stev.): crown gall, tumeur du collet: on *P. spp.* BC 47:87, 59:83, Man [93, p. 28]; on 4 Ont 45:94, NS 57:105; on 13 BC 52:89, Ont 24:28, 36:59; on 16 BC [535]; on 18 Ont 57:99; not uncommon on nursery stock.
- Alternaria* sp.: from spots on fruits of 4 Ont 62:80.
- Armillaria mellea* (Vahl ex Fr.) Kummer: root rot, pourridié-agaric: on *P. sp.*, 20 BC 36:54; on 16 BC 30:65, [535].
- Aureobasidium pullulans* (de Bary) Arn. (*Pullularia p.* (de Bary) Berkh.: associated with a storage rot of 16 BC 62:77.
- Botryosphaeria fuliginosa* (Moug. & Nestl.) Ell. & Ev.: on *P. sp.* Man [93, p. 59].
- Botrytis cinerea* Pers.: gray mold, moisissure grise: on *P. sp.* Alaska [175]; on seedlings of 2, 13 in greenhouse BC 59:72, 75; on fruit of 2 BC 57:99; on 16 BC 33:49, 46:67; on 16, 18 NS 28:41, [1138].
- Calosphaeria minima* Tul.: on *P. sp.*, 22 Ont F60:66.
- Caprionella pleiospora* (Mont.) Berl.: on 29a BC [50].
- Cenogium populneum* (Pers.) Rehm var. *prunicola* Rehm: on 29 Man [93, p. 39]; probably an *Encoelia*, fide Groves.
- Cercospora circumscissa* Sacc.: shot hole, criblure: on *P. sp.* Ont 25:63; on \times *P. sp.* Man 42:86; on 4 Man 44:90; on ?6 Man 45:104; on 23, severe, Man 42:90; on 29 Ont Que 42:vi.
- C. graphioides* Ell. ex Chupp: on 28 Ont 43:vi, not *C. circumscissa*, 42:vi.
- C. persica* Sacc.: reported on 13 NS [1138]; a doubtful record [cf. 190, p. 482].
- Cladosporium cladosporioides* (Fres.) De Vries (*Hormodendron c.* (Fres.) Sacc.): common on 4, 13, 18, 29 Ont [563].
- C. herbarum* Lk.: common on buds and bark of 4, 18, 29 Ont [563].
- Coccomyces hiemalis* Higgins (*Higginsia h.* (Higgins) Nannf., stat. conid. *Cylindrosporium hiemale* Higgins): shot hole, criblure: on 10 cult. Man 41:70; on 16 and/or 18 BC 30:64, [535], Man 38:78, Ont NS PEI 24:25, Que 25:29, Que NB 31:67, NB 28:40, NS [1138]; on 19 BC 42:80, [535]; on 22 Sask 30:98, Sask Man [93, p. 129], Que 32:106, [197], NB 55:105, NS 52:106. The perfect state is known on 18 Ont DAOM 13855, [cf. 1138]. The disease is of economic importance on cherries especially in the Niagara Peninsula, Ont, but also on the BC coast and in the Maritime Provinces.
- C. lutescens* Higgins (*Higginsia l.* (Higgins) Nannf.; stat. conid. *Cylindrosporium l.* Higgins): shot hole: criblure: on 29 Man [93, p. 130], Que 32:106, NS 52:106.
- Coccomyces prunophorae* Higgins (*Higginsia p.* (Higgins) Nannf.; stat. conid. *Cylindrosporium p.* Higgins): shot hole, criblure: on 4 BC 37:61, [535], Sask PEI 25:34, Man-Que 24:25, NB 32:76, [cf. 1138]; on *P. sp.* Que 33:119; on 1, 6 Man [93, p. 130]; on 1, 14 Man 42:104; on 7 Ont 24:29; on 23 Man 35:58; the disease is common on cult. plums and sporadically causes heavy defoliation.
- These fungi are not species of *Coccomyces*, but the name *Higginsia* is untenable. Von Arx reduced the species described by Higgins [439] to synonymy under *Blumeriella jaapii* (Rehm) Arx [17, p. 164],

Prunus

- stat. conid. *Phloeospora padi* (Lib.) Arx, originally described on *P. padus*. *Coccomyces lutescens* may be identical with *B. jaapii*, but Higgins' careful account suggests that more than one taxon is present as he demonstrated physiologic specialization with some morphological differences, not unlike that found in *Pseudopeziza trifolii*. For this reason Higgins' names are retained.
- Coniothyrium* spp.: associated with shot hole on *P. sp.* Man 39:83, × *P. sp.* Alaska [175]; on 14 cult. Man 39:101; on 22 Man 41:97; isolated frequently from buds and bark of 4, 13, 18, 22 Ont [563].
- Conoplea sphaerica* (Pers.) Pers.: on *P. sp.* Ont [484].
- Corticium contiguum* Karst. (*C. crustaceum* (Karst.) Höhn. & Litsch.): on *P. spp.* Man [93, p. 75].
- C. galactinum* (Fr.) Burt.: on *P. sp.* Ont [1160]; see *Abies*.
- Cylindrosporium* sp.: on fruit of 2 BC 48:77.
- C. padi* (Lib.) Karst.: reported on *P. sp.* in subgenus *C.* NS [1138]; cf. *Coccomyces prunophorae*.
- Cytospora* sp.: canker, chancre cytosporéen: on 4 Alaska [175]; on 13 Ont 30:69; on 16 NS 51:90.
- C. ambiens* Sacc.: on 17 Sask [93, p. 132].
- C. leucostoma* Sacc.: dieback, dépérissement: on *P. sp.* Sask Man [93, p. 133]; associated with winter-killing of 4 NS 57:104; 13 NS 50:103, 57:102 et seq.; on 29 NS [1138].
- C. ludibunda* Sacc.: on 18 Alaska [175].
- C. rubescens* Nits.: on cankers on 29 Alta F52:123.
- Daedalea confragosa* Bolt. ex Fr.: on *P. sp.* BC [1198].
- D. unicolor* Bull. ex Fr.: on *P. sp.* in subgenus *C.* NS [1138]; see *Acer*.
- Daldinia vernicosa* (Schw.) Ces. & de Not.: on *P. sp.* Ont F58:60.
- Dermea cerasi* (Pers. ex Fr.) Fr. (stat. conid. *Micropera drupacearum*, q.v.): on *P. spp.* BC Ont Que NS [370]; Ont Que 33:119, Ont F58:60, NB F55:26; on *P. sp.*, 22 NS [1138]; on 16, 18 Alaska [175]; ? on old wood, probably *P. sp.* Ont [93, p. 39].
- D. padi* (Alb. & Schw.) Fr.: on 22 Ont F60:66.
- D. prunastri* (Pers. ex Fr.) Fr. (stat. conid. *Micropera spuria*, q.v.): on *P. spp.* Ont Que NS [370]; on *P. sp.*, 29 Ont F60:66.
- Diaporthe pruni* Ell. & Ev.: on *P. sp.* Ont F60:66; on branches of 6 Man [93, p. 57].
- D. prunicola* (Pk.) Wehm.: on *P. sp.*, 29 Ont F60:66.
- Diatrype albopruinosa* (Schw.) Cke.: on 29 Man [93, p. 58].
- D. stigma* Hoffm. ex Fr.: on branches of *P. sp.* Man, 29b Sask [93, p. 59].
- Diatrypella discoidea* Cke. & Pk.: on *P. sp.* NS [1138].
- D. verrucaeformis* (Ehrenb.) Nits.: on branches of 29 Man [93, p. 59].
- Dibotryon morbosum* (Schw.) Theiss. & Syd. (*Plowrightia morbosa* (Schw.) Sacc. [*Apiosporina m.* (Schw.) Arx]): black knot, nodule noir: This native pathogen is widespread: on *P. spp.* BC [50], Que [8], NB NS PEI [1138]; on 2 BC 46:67 [535], NS 56:104; on 3a Ont 38:107; on 4 BC Man-Que NS PEI 24:29, BC [535, 1198], Sask 25:34, Nfld 49:xx; on 5 BC [535]; on 6 cult. NS 62:90; on 7, rare, Ont 44:91, NS 53:96; on 8 BC [1198]; on 9 BC [1203]; on 13 NS 55:108, 59:75; on 15 NS 46:78; on *P. sp.* (cherry), especially native species, BC Man Ont Que NS PEI 24:25, NB 27:41, Nfld 52:85; on 16 Alaska [175]; on 18 Alaska [175], Que 58:90, PEI 39:83, Nfld 49:xx; on 21 NS 48:78; on 22 Alta 53:93, Sask 29:54, [93, p. 46], Sask Man 48:100, Que 45:91, [53], NB 26:39, NB NS F58:28, PEI 49:97, Nfld 49:xx; on 23 Man F51:144, [93], Ont 50:117; on 23b Ont 50:117; on 26 NS 59:77; on 27 Alta 55:117; on 27a Man 29:54, [93], Que 50:100; on 29 Alta F52:123, Sask Man Ont 29:54, Man [93], Que 54:112, NB 30:98, [1138]; on 29a BC [535, 1198], BC interior 39:83, F52:151; on 29b Sask 30:98, [93]; reported on 28, but the host is probably 29, PEI 49:97.
- Commercial orchards of cherries and plums are rarely affected, but this immunity is probably due to these orchards being regularly sprayed. Certainly failure to protect young orchards has resulted in destructive outbreaks. A few cherry trees in the farm orchard were common in Ont 100 years ago, but black knot was one cause of their destruction and disappearance. Although black knot may be kept in check by regular spraying NS 51:96, the disease can become epidemic in two years of its appearance Nfld 57:104.
- Some conidia overwinter in a viable condition and others develop from chlamydospores on buds and barks of 4 Ont [563].
- Diplodia ?pruni* Fckl.: on branches of 29 Man [93, p. 133].
- Erwinia amylovora* (Burr.) Winslow et al. (*Bacillus amylovorus* (Burr.) Trev.): fire blight, brûlure bactérienne: on 2 Man 41:69, Ont 54:110; on 4 BC 30:72, Sask 35:56, Man 25:35, 41:75; on 6 Man 33:55, [93, p. 27]; on ?17 Man [93].
- Exidia recisa* (Dittm.) Fr.: on 28 NS [1138].
- Fenestella princeps* Tul.: on bark of 29a BC [50].
- Fomes ignarius* (L. ex Fr.) Kickx: on 29 Ont F55:59.
- F. pinicola* (Sw. ex Fr.) Cke.: on *P. sp.* BC [791]; on 13 BC 40:78; on 28 Ont [740].
- F. pomaceus* (Pers.) Lloyd (*F. fulvus* (Scop. ex Fr.) Gill.): on 1 Man [93, p. 81]; in culture very close to *F. ignarius* (q.v.), [791].
- F. subroseus* (Weir) Overh.: on 19 BC [1198]; see *Abies*.
- Fumago vagans* Pers., sensu Fant.: commonly isolated from 1, 4, 13, 18, 22, 29 Ont [563].
- Fusarium* spp. from *P. spp.*: *F. equiseti* (Cda.) Sacc., *F. sambucinum* Fckl., *F. solani* (Mart.) App. & Wr. from blighted seedlings of 2 Man; *F. acuminatum* Ell. & Ev., *F. equiseti* from roots of plum seedlings, Man; *F. arthrosporioides* Sherb. from rotted fruit of 13 Man; *F. equiseti*, *F. moniliforme* Sheld., *F. oxysporum* Schlecht., *F. solani* from the rhizosphere of 13 seedlings, Ont; *F. equiseti* from fruit, *F. oxysporum* from basal parts of 17 Man [335].
- Fusicladium carpophilum* (Thüm.) Oud. (*Cladosporium c.* Thüm.): scab, tavelure: on 4 Alta Que NB 32:76, Man Que 24:29, Ont 36:70, Que 31:75, NB 29:55; on ?4 NS [1138]; on 6 Ont 34:67, 48:84; on 13 Ont 24:27, [478, p. 568], Que 32:72, NS 50:103, 51:94, [1138]. A disease of minor importance although occasionally the fruits are seriously disfigured. The fungus was isolated from chlamydospores on bark of 13; twig lesions also occur. The study demonstrated the value of dormant sprays [563]. The perfect state, *Venturia carpophila* E.E. Fisher [293, p. 339], was found on overwintered leaves of 2 in Australia.
- Fusicladium cerasi* (Rabh.) Sacc. (*Cladosporium c.* (Rabh.) Bensaude & Keitt, *C. carpophilum* auct.): scab, tavelure: on 16 BC 49:82, [535]; on 18 Ont 33:50; *F. cerasi* is closely related to *F. carpophilum*, but Bensaude and Keitt [69] showed that the fungi are distinct taxons. For a recent description of the perfect state, *Venturia cerasi* Aderh., see Schweizer [974].
- Ganoderma applanatum* (Pers. ex Wallr.) Pat. (*Fomes applanatus* (Pers. ex Wallr.) Gill.): on 4 BC 38:86, [535]; on 16 BC 36:54; on 29 Man 45:104.

- Ganoderma applanatum* var. *brownii* (Murr.) Humphrey & Lenz: on *P. sp.* BC F61:125.
- Gloeodes pomigena* (Schw.) Colby: on *P. sp.* in subgenus A, NS [1138]; doubtful record.
- Gloeosporium serotinum* Ell. & Ev. [*Colletotrichum gloeosporioides* Penz.]: leaf spot, tache des feuilles: on 28 NS 51:107.
- Glomerella cingulata* (Stonem.) Spauld. & Schrenk: bitter rot, pourriture amère: on fruit of 18 Que 54:100, 58:90.
- Godronia urceolus* (Alb. & Schw.) Karst. var. *conferta* Hone [G. c. (Hone) Groves]; on *P. sp.* NS [1138].
- Hymenochaete tabacina* (Sow. ex Fr.) Lév.: on *P. sp.* NB Nfld F53:24.
- Hypoxylon multifforme* Fr.: on 19 BC [1198].
- Lenzites saepiaria* (Wulf. ex Fr.) Fr.: on 19 BC [1198].
- Massaria conspurcata* (Wallr.) Sacc.: on dead branches of *P. sp.* Man [93, p. 56].
- M. pruni* Wehm.: on twigs of *P. sp.* NS [1138].
- Melanconium cerasinum* Pk.: on branches of *P. sp.* Man [93, p. 131].
- Micropera drupacearum* Lév.: on *P. sp.*, 22 NS [1138]; on 6, 17 Man [93, p. 134].
- M. spuria* (Fr.) Höhn.: on *P. sp.* NS [1138].
- Monilinia demissa* (Dana) Honey: brown rot, pourriture brune: on 29a BC 62:90, DAOM 89789.
- M. fructicola* (Wint.) Honey (*Sclerotinia f.* (Wint.) Rehm, *S. americana* (Worm.) Norton & Ezekiel): brown rot, and blossom and twig blight, pourriture brune: on 2 BC 48:78, Man 44:86, Ont 54:110, 57:99, NS 52:84; on 4 BC Man-Que NS PEI 24:29, BC [535], Alta 34:66, Sask 42:87, NB 25:34; on 6 Man 31:116, [93, p. 41]; on 7 Man 23:60, NS 46:70; on 11 NS 43:98; on 11, 15, 17, 29 NS 52:106; on 12 NS 46:78; on 13 BC Ont 24:27, BC 30:69, 48:81, [535, 1198], NS 52:90; on 13b BC 48:81, [535]; on 15 Que 38:107; on 15, 26 NS 53:109; on 16 and/or 18 BC Man Ont NS PEI 24:25, BC [535], Que 34:61, NB 38:79; on 17 Man 45:95, [93], Ont 51:100, NS [1138]; on 23 Sask Man 40:84, Ont 44:92, NS 38:89; on 24 BC 42:80; on 26a Sask 24:25 [93]; on 28 Que 29:49; on 29 BC 62:105, Man 45:104.

Brown rot is present on plums every year in the moister parts of Canada and the damage may be great when the crop is heavy and the weather is wet before or during harvest. Blossom blight occurs occasionally Ont 20:30, 44:91, or the twigs are affected PEI 44:91. Apothecia are present in the spring Ont 31:74.

Brown rot is common on peaches in the Niagara Peninsula, Ont, and frequently is epidemic under moist conditions when tons of fruit are lost in the orchard or during transit and marketing, 33:53. The fungus also causes blossom blight, 40:78, and may produce incipient cankers, 39:88, 56:106, which may then be invaded by *Cytospora*. Apothecia are sometimes abundant Ont 42:63. Application of cyanamide to the orchard floor reduced or eliminated apothecium clusters on the ground but only reduced slightly the level of blossom blight Ont 44:88. Numerous factors influence the level of infection, 47:91, but timely spray applications reduce the loss.

During the growing season, the fungus parasitized the tissues of branches and caused considerable necrosis during the first three weeks after the branches were experimentally inoculated, but the pathogen is not regarded as the cause of typical peach canker [1169].

Depending on the weather, the fungus is destructive to cherries as a blossom blight or brown rot

of the fruit both on the trees and after picking. Spraying reduced the losses. For germination studies on the conidia, see [759].

- M. laxa* (Aderh. & Ruhl.) Honey (*Sclerotinia l.* Aderh. & Ruhl., *S. cinerea* auct.; stat. conid. *Monilia oregonensis* Barss & Posey): blossom and twig blight, and brown rot, pourriture brune: on 2 BC 45:90, 46:67, 59:72, [535]; on 4 BC 42:87 et seq., [535]; on 12 BC 48:100, [535]; on 15, 17 BC 42:104; [535]; on 16 and/or 18 BC 30:64, 32:68, 47:88, 57:100, [535]; on 25a BC 62:90; reported most frequently as the cause of blossom and twig blight.
- M. padi* (Wor.) Honey: blossom and twig blight, brûlure sclérotique: on 18 PEI DAOM 63289, 59:73, 61:93.
- M. seaveri* (Rehm) Honey: on 28 Que, rare, DAOM 43137.
- Mycosphaerella cinerascens* (Fckl.) Migula: on leaves of 19 BC [50].
- Nectria cinnabarina* Tode ex Fr.: on *P. sp.*, 4, 18, 27 Alaska [175]; on *P. spp.* Man, 29b Sask [93, p. 46]; on 13 NS 55:108; on 29 Que 31:123.
- Peniophora aspera* (Pers.) Sacc.: on *P. sp.* NS F53:25; on 19 BC [1198]; see *Abies*.
- P. cinerea* (Fr.) Cke.: on 29 NS [1138].
- P. gracillima* Ell. & Ev.: on *P. sp.* NS [1138].
- P. incarnata* (Pers. ex Fr.) Karst.: on 19 BC [1198].
- Phlebia radiata* Fr.: on 19 BC [1198].
- Phoma pruni* Pk.: on twigs of ?29 Man [93, p. 134].
- Phomopsis ?padina* Sacc.: on 18 Alaska [175].
- Phyllosticta circumscissa* Cke.: leaf spot, tache des feuilles: on *P. sp.* cult. Man [93, p. 135]; on *P. sp.* Que 33:119; on 2 Man 44:86; on 4 Man 38:76, Que 46:70; on 13 Ont 25:32; on 26 Man 42:104.
- P. virginiana* (Ell. & Halst.) Tassi: on 14 Man, 29 Man Ont 44:101; on 29 Man [93, p. 136].
- Phytophthora cactorum* (Leb. & Cohn) Schroet.: fruit rot or collar rot, mildiou du collet: on 2 BC 49:82, 57:99; on 13 BC 53:95, 57:103, 59:76; on 16 BC 51:90, 55:105, 59:73, 61:93.
- Podosphaera clandestina* (Wallr. ex Fr.) Lév. (*P. oxycanthiae* (DC.) de Bary): powdery mildew, blanc: on *P. spp.* BC, common [50]; on 2 BC 40:73, 42:79, 53:93; on 4 Alta 55:110, Man 43:87; on 13 BC 51:95, 61:94, [535]; on 16 and/or 18 BC Man-Que 24:25, BC [535]. Powdery mildew appeared to be of minor importance until fungicides other than sulphur came into general use Ont 56:106; on 17 Sask Man [93, p. 44]; on 18 Man 43:98; on 19 BC 45:104; on 22 NS 54:125; on 23 Alta 42:90, Sask 29:58, Man 38:89, [93]; on 29 cult. Man 40:74; on 29a BC 25:80, 51:107, [535], Que 26:30; on 29b Sask 50:117, [93].
- Polyporus abietinus* Dicks. ex Fr., *P. albellus* Pk. and *P. guttulatus* Pk.: on 19 BC [1198].
- P. hirsutus* Wulf. ex Fr.: white spongy rot, carie blanche spongieuse: on or from 2 BC 38:76, [791]; on 13 BC 40:78.
- P. nidulans* Fr. (*P. rutilans* Pers. ex Fr.): on 19 BC [1198].
- P. pargamenus* Fr.: on dead 22, 28, 29 Ont F55:59.
- P. pubescens* Schum. ex Fr.: on 6 Man [93, p. 83].
- P. sulphureus* Bull. ex Fr.: on *P. sp.* NS [1138].
- P. tulipiferae* (Schw.) Overh. (*Irpex t.* Schw.): on *P. sp.* NS [1138]; from 2 BC [791]; on 6 Man [93, p. 84].
- P. versicolor* L. ex Fr.: on *P. sp.* BC [791]; on 4 BC 38:86, [535]; on 6 Man [93]; on 19 BC [1198].
- Poria cinerascens* Bres.: on or from 19 BC [791, 1198].
- P. ferrea* (Pers.) Bourd. & Galz.: on 19 BC [1198].

Prunus

Poria prunicola (Murr.) Sacc. & Trott.: on *P. sp.* Man 93, p. 84], NB [1138].

P. subacida (Pk.) Sacc.: from 19 BC [1198].

P. versipora (Pers.) Rom.: on 19 BC [1198].

Pratylenchus penetrans (Cobb) Filip. & Stekh.: root-lesion nematode, nématose des racines: on 13 Ont 56:107; on 16 and/or 18 Ont 59:74.

The failure of young trees to become established on old sites in bearing orchards of 13 in Ont became known as the 'peach replant problem.' The problem was discussed, the affected area delimited and the symptoms described [566]. The failure was shown to be caused by toxic substances released by microbial decomposition of peach root residues [833]. Analysis showed that the highest concentrations of amygdalin are in the bark of the roots and this glucoside was thought to be the source of the toxic material. Factors such as cultivar and season affected the amygdalin content [1133].

Fumigation of infested soils resulted in greater growth of peach seedlings and a striking reduction of fungus populations in the rhizosphere over that of untreated soils. The said fumigants, however, did not modify the depressing effect of toxins on the growth of replants on tree sites [1151].

The peach replant problem is more serious in Essex Co. that in the Niagara Peninsula apparently because of the greater concentration of *P. penetrans* in the orchard soils of the county. The coarser particle size of soils in Essex Co. is thought to favor the nematode [748]. Additional evidence obtained from replanting at various intervals from the original tree site and noting the effect on plant survival and nematode population and from the application of nematicides and their effect on nematode populations and growth of young trees in the treated soils supported the view that the problem arises from the presence of sizeable populations of *P. penetrans* [749]. The nematode was shown to be a true pathogen as it invades and causes necrosis of roots of 13 in the absence of bacteria and fungi. The main mechanism of lesion formation is the production of phytotoxic substances through the hydrolysis of the cyanophoric amygdalin. The nematode provides extensive infection courts for soil microorganisms [751].

Pseudomonas syringae van Hall: blast, coulure bactérienne: on 24 BC 62:90; ? on 2 Man 45:90.

Pycnoporus cinnabarinus (Jacq. ex Fr.) Karst. (*Polyporus c.* Jacq. ex Fr.): on *P. sp.* PEI [1138]; on 22 NB F53:26.

Radulum owensii Lloyd: on *P. sp.* BC [1198].

Rhizopus nigricans Ehr.: fruit rot, moisissure chevelue: on imported fruit of 4 from the US 52:91; on fruit of 13 BC 41:73, 61:94, [535], Ont 58:93, 59:76, NS 49:84; much less prevalent than brown rot.

Rosellinia ligniaria (Grev.) Nits.: on branches of *P. sp.* Man [93, p. 51].

Schizophyllum commune Fr.: white spongy rot, carie blanche spongieuse: on 4 NS 47:92; on 13 Ont 32:74.

Schizoxylon insigne (de Not.) Rehm: on twigs of *P. sp.* Man [93, p. 42].

Solenia anomala (Pers.) Fckl.: on *P. sp.* Man [93, p. 78].

Sphaerographium niveum Dearn. & House: on *P. sp.* Man [93, p. 140]; a misdetermination as *S. niveum* is the conidial state of *Pezicula morthieri* (Fckl.) Groves on *Rhamnus*.

Sphaeropsis malorum Berk. ex Pk.: on 4 Sask 31:75; ? on *P. sp.* Man [93, p. 140]; see *Malus* sub *Botryosphaeria obtusa*.

Sphaerotheca pannosa (Wallr. ex Fr.) Lév.: powdery

mildew, blanc: on *P. sp.* BC [50]; on 13 BC Ont 24:27, NS 58:93; on 13b BC 32:73, 33:52; a minor disease of 13 whenever sulphur or lime-sulphur was used to control the disease; both terminal growth and the fruit are affected.

- Sporormia ?leptosphaerioides* Speg.: on old pits of 6 Man [93, p. 50].
- Sporotrichum parasiticum* Pk.: on *Dibotryon morbosum* on *P. sp.* Man [93, p. 127].
- Stereum hirsutum* (Willd. ex Fr.) S.F. Gray: on *P. sp.* BC [1199].
- S. purpureum* (Pers. ex Fr.) Fr.: silver leaf, plomb: on *P. spp.* Sask 38:80, Man [93, p. 78], NS PEI [1138]; on 4 BC [535]; on 18 PEI 39:84; on 19 BC [1198]; on 23 Sask 38:89; on 27 Alaska [175]; on 30 BC 59:83; symptoms present on 4 BC 51:95, Man 24:29, NS 30:72.
- Stigmina carpophila* (Lév.) M.B.Ellis (*Clasterosporium carpophilum* (Lév.) Aderh., *Coryneum beijerinckii* Oud.): blight, brûlure ou criblure: on *P. sp.* Man 44:92; on *P. sp.*, 17 Sask [93, p. 116]; on 2 BC 32:67, [535], Ont 54:110, 57:99; on 4 BC 47:92, [535], Que 61:95; on 13 BC 31:72, [535], Ont 37:80, [478]; on 16 and/or 18 BC 43:84, 47:87, 48:78; on 19 BC [535]; on 23 Sask 24:26; on 30 BC 59:83, 61:106. Sometimes severe on apricots in unsprayed orchards BC 48:77, 51:89, but spraying reduced the injury to the fruit and twigs, 52:84, 54:93. The pathogen also causes a destructive disease on peaches, but again it is fairly well controlled by spraying, 52:89.
- Taphrina communis* (Sadeb.) Gies.: plum pockets, pochette: on 1 Sask Man, 6 Ont Que [735], Ont 41:77; on 4 Sask 36:60, NS [1138]; on 6 Sask Man [93, p. 34], Ont 35:55. Herbarium records suggest that *T. communis* is the common species on plum in Canada. The wild plums, 1 and 6, are affected and probably hardy cultivars from crosses of 4 and the native species. On the other hand, *T. pruni* (q.v.) is reported on 4, but on this host it is confined to small unsprayed plantings.
- T. confusa* (Atk.) Gies. (*T. cecidemophila* (Atk.) Gies.): pockets, cloque: on 29 Ont NS [735], Que 48:101, NB F58:28, NB NS [1138]; on 29a BC 46:78.
- T. deformans* (Berk.) Tul. (*Exoascus d.* (Berk.) Fckl.): leaf curl, cloque: on 13 Alaska [175], BC Ont NS 24:27, BC [535, 1198], Ont [735], Que 33:52, NB 42:83, NB NS [1138]; on 13a Ont 55:117; on 13b BC 51:94. Leaf curl is present every year in peach-growing districts and in seasons favorable for the disease the losses are heavy on unsprayed trees. Although the disease is readily controlled by a dormant spray, a spring application was not always possible on account of wet weather. A fall or winter application proved equally effective BC 51:95, Ont 37:59. For this reason a fall spray after leaf fall, provided the day is dry and the temperature above freezing, is preferred. The fungus was isolated during the winter from buds of 13 in Ont [563].
- T. flavorubra* Ray: pockets and shoot hypertrophy, cloque: on 17 Ont NB NS PEI 52:106, PEI [735]; on 23 Ont 54:113; on 17 Alta (as *T. ?communis*) 33:59; on 17, 17 × 7 Man (as *T. deformans*) [93, p. 34].
- T. mirabilis* (Atk.) Geis.: on 17 Ont 42:90, PEI [1138], but later determined to be *T. flavorubra* by Mix.
- T. pruni* Tul.: plum pockets, pochette: on 1, 6 Man 29:53, Que 22:42; on 24 NB NS PEI [1138]; on 4 BC 43:87, [535], Alta 32:75, Sask-Que NS PEI 24:29, Man [735], NB 36:16.
- T. wiesneri* (Rathay) Mix [736, p. 64] (*T. cerasi* (Fckl.) Sadeb., *T. minor* Sadeb., *T. insititiae* auct., *Exoascus*

- cerasi* Fckl.): witches'-broom, cloque-balai de sorcière: on *P. sp.* NB NS [1138]; ? on *P. sp.* PEI 47:88; on 16 Alaska [175]; on 16 and/or 18 BC Ont 24:25, BC 34:107, 49:83, [535]; on 18 BC, 22 Man Ont Que [735]; on 22 Sask Man [93, p. 34], Man Ont Que NS 43:98, Que 35:58, F53:49, NB F56:26; on 19 BC [1198], but Mix [735] has placed the fungus on this host in *T. flectans* Mix.
- ?*Torula* sp.: frequently isolated from bark of 4 and occasionally from 18 Ont [563].
- Tranzschelia discolor* (Fckl.) Tranz. & Litv. (*T. pruni-spinosae* (Pers.) Diet. var. *d.* Dunegan [269, p. 424]: rust, rouille: II III on 4 BC 32:76, 46:71, 57:105, [535], [cf. 1198]; 0 I known on *Anemone coronaria*, BC [1198]; an introduced rust; see Dunegan [269] and Blumer [95] for a description.
- T. pruni-spinosae* (Pers.) Diet., sensu lat.: II III on 1, 13, 28, 29 Ont [828]; on 28 Ont 46:71, [15, p. 72]. The rust on 28 has been segregated as *T. arthuri* Tranz. & Litv., with 0 I on *Anemone quinquefolia* [15], but how valid is the segregation from *T. pruni-spinosae* sensu strict. has not been established.
- Trechispora brinkmanni* (Bres.) Rogers & Jacks.: on 19 BC [1198]; see *Abies*.
- Trichothecium roseum* (Pers.) Lk.: on fruits of *P. sp.* Man [93, p. 128].
- Tubercularia vulgaris* Tode: on *P. sp.* Nfld F53:27; on 17 Sask [93, p. 128]; on 22 Alta 35:58; on 27a Alta F63:105; on 29 NS [1138].
- Tympanis prunicola* Groves (*T. prunastri* Rehm): on *P. spp.* Ont Que NS [372, p. 616]; conidial state on *P. sp.* NS [1138] DAOM 4698.
- Valsa* sp.: canker, chancre cytosporéen: on 2 Alta 45:91, Ont 33:49, 51:90; on 13 after winter injury Ont 62:79.
- V. ambiens* (Pers. ex Fr.) Fr.: on 4 Ont 31:75; on 6 Man, 17 Sask [93, p. 57]; on 23 Sask 31:79.
- V. cincta* Fr.: on twigs of *P. sp.* Man [93, p. 58]; on 7 NS 51:107.
- V. cincta* and *V. leucostoma* (Pers.) Fr.: peach canker, chancre cytosporéen: isolated consistently from cankers of 13 Ont 33:53, 49:85, [1169]. It is probably one of the most important factors in reducing peach production, 59:76. *V. cincta* is a virulent wound parasite able to infect fresh wounds during late autumn, winter and spring and give rise to perennial cankers. *V. leucostoma* is only just capable of initiating cankers [1169]. Over a 7-year period, sources of cankers in order of importance were dead twigs, leaf scars, fruit pedicels and pruning wounds. The incidence of peach canker and winter injury is increased by prolonging the period of open cultivation [1170].
- V. leucostoma* (Pers.) Fr.: dieback, dépérissement: on *P. spp.* Sask Man [93, p. 58]; on 4 BC [535]; on 13 BC 47:91, [50, 535], NS 52:90; on 13b BC 45:92, [535]; on 23 NS [1138]; on 27 Alaska [175].
- Valsella laschii* (Nits.) Sacc.: on branches of 17 Sask [93, p. 58].
- Verticillium* spp.: wilt, flétrissure verticillienne: on 2 BC 44:86 et seq.; on 4 Ont 32:76, 46:71, 57:104, occasionally destructive; on 13 BC 39:76; 52:90, Ont 28:46, 42:83; on 16 Ont 57:103; on 16 and/or 18 BC 44:87, Ont 32:68, particularly young trees. Recent studies suggest that *V. dahliae* Kleb., rather than *V. albo-atrum* Reinke & Berth., is the main pathogen in Ont and is also the important species in the BC interior. However, what appears to be *V. albo-atrum* was isolated from young trees of 13 in the Niagara Peninsula, Ont [690]. For a fuller discussion, see *Solanum*.
- Xanthomonas pruni* (E.F.Sm.) Dowson (*Bacterium p. E.F.Sm.*): bacterial spot, tache bactérienne: on 4 Ont 31:75, 44:91, Que 25:35; on 7 Ont 38:86, 56:108, NS 49:86, 50:104; on 13 Ont 24:27, 42:84, NS 52:91; occasionally epidemic Ont 56:107; cultivars differ in susceptibility Ont 61:95; on 16 and/or 18, severe in nursery Ont 44:87.
- Apricot ring pox virus: ring pox, vécule annulaire: on 2 BC 44:86 (as ring spot), 55:106; also symptomless. 29a is apparently infected when near infected orchards of 2, 58:89, [cf. 2].
- Cherry black canker virus: black canker, chancre noir: on 16 BC 55:105, [2].
- Cherry green-ring mottle virus: green-ring yellows, jaunisse annulaire: on 18 Ont 48:79, 50:100, [2]; spreads very slowly in the orchard if at all, 51:94.
- Cherry Lambert mottle virus: Lambert mottle, marbrure de la Lambert: on 16 BC 40:74, 46:68, 62:78, [2, 613].
- Cherry little cherry virus: little cherry, petite cerise: on 16 BC 39:84, but first noted in 1933, 41:71. The virus spread rapidly in the Kootenays until only a very few healthy trees remained, 47:88, [1168]. The disease has been the major factor in the decline of cherry production in the area. Fortunately it has not appeared in the cherry orchards of the Okanagan and Similkameen Valleys, 61:93, [cf. 2, p. 126].
- The virus nature of the disease was established by graft transmission in 1943. Certain cultivars and seedlings of 16, notably Starr, when affected were found to develop a characteristic reddening of the leaves whereas the usual commercial cultivars are symptomless except for the failure of the fruit to size and mature. Infected 18 develops similar symptoms, but 13 does not appear to be affected [308]; 21 is symptomless, 50:101.
- Wilde [1167] reported successful transmission of the virus by *Macrostes fascifrons* (Stål) in 7/170 trees tested and single transmissions by two other leafhoppers. Symptoms developed only 2 to 4 years after the tests.
- The Kwanzan and Shiro-fugen cultivars of 25 were found infected in Wash with a latent virus that produced little-cherry symptoms in 17 and it was suggested that the virus might be identical with CLCV in the Kootenays [869]. The same cultivars of 25 growing at Summerland, BC, were found to be similarly infected, 58:91. However, K. & S. virus has not spread to 16 either in Wash or in the Okanagan Valley [617].
- Cherry mottle leaf virus: mottle leaf, marbrure: on 16 BC 40:75, 55:106, [2], ? Ont 41:71, 47:90, 50:102, 52:89.
- Cherry necrotic ring spot virus: necrotic ring spot, tache annulaire nécrotique: on 18 Ont 39:83, (as false shot-hole), 40:75, 41:71, NS 50:101, (as ring spot), (as necrotic leaf spot), 42:80, 43:85, 47:88, [2, 80]. A study of the disease in the orchard indicated that a greater percentage of the trees are likely to be infected with this virus when set out than with the yellows virus. Rates of spread are largely determined by initial incidence and relative position of affected and healthy trees at planting. Rates of spread of both viruses are similar, but yellows spreads mostly from a diseased to adjacent healthy trees [1174]. Multiple strains appear to be present, 51:94. Etching is a symptom of necrotic ring spot, 51:92. Pollen transmission of CNRSV and cherry yellows virus (q.v.) in 18 cultivar Montmorency was demonstrated [324].
- Cherry necrotic rusty-mottle virus: necrotic rusty mottle, marbrure-rouille nécrotique: on 16 BC 55:106, 59:73.

Prunus

- Cherry rasp leaf virus: rasp leaf, feuille lacérée: on 16 BC (as leaf enation) [2, 455], 44:87, 62:78; on 16, 18 Ont 51:91; on 18 Ont 50:102.
- Cherry rough bark virus: rough bark, écorce rugueuse: on 24 BC 59:83, [cf. 2].
- Cherry rugose mosaic virus: rugose mosaic, mosaïque rugueuse: on 16 BC 49:83, 53:94, first reported as rasp leaf, 47:89; in Ont 50:101.
- Cherry rusty mottle virus: rusty mottle, marbrure-rouille: on 16 Ont 50:102.
- Cherry tatter leaf virus: tatter leaf, feuille déchiquetée: on 16 Ont 42:81 et seq.; symptoms on 16 and other *P. spp.* are described and the relative value of double-budding and direct-inoculation techniques are discussed [1173].
- Cherry twisted leaf virus: twisted leaf, feuille tordue: on 16 BC 40:75, [2]; widespread on 30a, a symptomless host, 59:74.
- Cherry yellows virus: yellows, jaunisse: on 18 BC 59:74, Ont 42:81, [2, 80, 1174], NS 50:102, 52:89. There is an indication of multiple strains, 51:94. Yellows is a prevalent virus disease of 18. The purification and electron microscopy of CYV and of several other viruses are described [1176]. Improved techniques in the preparation of virus extracts for serological study are described [1177]. Virus entities in cucumber associated with cherry yellows, green ring mottle and necrotic ring spot of 8, tatter leaf of 16 and prune dwarf were found to be serologically related but not identical [1091].
- Minor virus diseases of cherry: mild mosaic, mosaïque bénigne: on 16 BC 40:75; mosaic, mosaïque: of 16, BC 35:52; abnormal fruit, malformation du fruit: on 16, 18 Ont 52:89; reversion, régression: on 16 BC 48:79, 53:94.
- Peach little peach virus: little plum, petite prune: on 4 Ont 39:92, 42:88. Little peach, petite pêche: on 13 Ont 24:28 et seq., [2]; see also peach yellows.
- Peach wart virus: peach wart, verrue: on 13 BC 47:92, 62:79, [cf. 2].
- Peach western X-disease virus: western X-disease, virose X de l'Ouest: on 13 BC 40:79, 41:73 et seq., [2]. From 1939 to 1949 the disease was the most serious disease of 13 in the s. Okanagan Valley, BC, but now it is rarely observed, 62:79. Its decline in importance may be related to the control of the vector through the use of DDT or other insecticides, 61:95. Two important vectors of the virus, *Colladonus geminatus* (Van D.) and *Scaphytopius acutus* (Say), occur in BC, 54:112.
- Small bitter cherry, petite cerise amère: on 16 BC 47:89, 49:84, [2, 615, 616]; the virus in 16 was shown to be identical with western X-disease virus in 13, 59:74.
- Peach X-disease virus: X-disease, virose X: on 13, 30 Ont 41:74 et seq., [2]; on 16, 29 Ont 59:74; on 18, 29 Ont 53:94. The leafhopper vector, *Colladonus clitellarius* (Say), is locally common in s. Ont and s. Que, 54:112.
- Peach yellows virus: peach yellows, jaunisse du pêcher: on 4 Ont 39:92; on 13 Ont 24:28 et seq., [2]; on 7, 13 Ont [155]. Yellows was epidemic in the Niagara district "from about 1878 to 1883 or 1884"; both yellows and little peach were epidemic "from about 1908 to 1913" and again "1933 to 1935." Losses were reduced by systematic inspection of orchards and early removal of affected trees. However, in the latter epidemic 20,000 trees valued at \$200,000 were destroyed by the end of the 1936 season [155]. The plum leafhopper vector, *Macropsis trimaculata* (Fitch), occurs in s. Ont, s. Que and NS [62]. The insect was common 1932-1936, but it declined sharply in 1938 and both yellows and little peach were less prevalent in 1939, 39:88. The disease is unknown in Essex Co., Ont.
- Plum line pattern virus: line pattern, mosaïque nervale: on 7 Ont 39:92, 50:105, [2, 1172], NS 49:86; the symptoms produced by the virus on other *P. spp.* are described [1172].
- Prune dwarf virus: prune dwarf, nanisme: on 4 BC 38:86, 40:82, 44:91, Ont 39:91 (as prune mosaic), 41:77, [1171], NS 53:96; transmitted to 13 Ont 40:79, [1171]; on 16 Ont [2, 1171], formerly called Eagle mottle virus and Elkhorn ringspot virus [455]; ? on 13 BC 41:73, 42:85.
- Boron deficiency, carence de bore: dieback, dépérissement: on 2 BC 40:73, 46:67, [296]; there seems some doubt whether drought spot, liège, in *P. spp.*, BC 30:63, 31:66, 34:60, 40:73, is also a symptom of boron deficiency, 37:53, 39:82. On the other hand swollen nodes are associated with excess of boron, 51:96, 52:85; on 4 BC 47:93, 49:86; swollen nodes indicate excess boron, 51:96, 52:91; on 13 BC 44:90, 45:94, 46:67, [716]; on 16 BC 34:82, 37:53, 47:90. Boron deficiency differs from winter-killing in that there is no evident injury until after growth has started in the spring [716]; symptoms of excess boron are also described [716, cf. 2]. The syndromes associated with boron deficiency and excess in peach, apricot, prune and cherries have been described by Woodbridge [1181].
- Chemical injury: on 4 from fungicides, BC 43:88, Ont 40:81, 42:88. On 13 from fertilizer, Ont 49:85, 55:19; from fungicides, Ont 40:80, 44:90; from insecticides, BC 41:74, 61:95, Ont 37:60.
- Crinkle leaf: a nontransmissible viruslike disease on 16 BC 38:79 et seq., Ont 47:90.
- Fluoride excess: soft suture, suture molle: The disorder occurred near a tile plant in the Niagara Peninsula, Ont; determination of the fluoride levels in the orchard of 13 indicated the fluoride level was highest in the vicinity of the plant [268].
- Frost injury: on 16 BC 51:94; on 18 Ont NB 36:54, Ont 56:105.
- Gummosis, gommose: cause unknown, cause inconnu: on 16 BC 58:92, Ont 50:102; on 18 Que 58:92, PEI 36:54.
- Iron deficiency, carence de fer: chlorosis, chlorose: on *P. spp.* BC Ont 44:88, Alta 35:52.
- Low temperature, basse température: winter injury, gelure: on 2 BC 36:53; on 4 BC 25:35, Ont 34:96; on 7 Ont 52:92; on 13 BC 36:58; BC Ont 25:33, Ont 34:65, Ont NS 57:103; on 16 and/or 18 BC 24:26, Ont 32:69, Que 34:62, NS 57:102.
- Manganese deficiency, carence de manganèse: chlorosis or shot hole, chlorose ou criblure: observed first on 2, 13 and then later on 4, 16 in the BC interior; the deficiency was corrected by foliar sprays of manganese sulphate [1183].
- Pseudocrinkle: cause uncertain, cause incertain: on 16 Ont 50:102, 51:94, 52:87.
- Potassium deficiency, carence de potasse: leaf scorch, pyrolose: on 4 Ont 49:86; on 13 Ont 35:55 et seq., 54:112, [cf. 2].
- Wet weather, temps humide: fruit splitting, fendillement: on 16 BC 32:69.
- Zinc deficiency, carence de zinc: little leaf or rosette, rosette: on 2 BC 52:85; on 4 BC 51:88; on 4, 13, 16 BC 51:88, 95, [cf. 2]; on 2, 4, 13, 16 BC interior [1180]. When the deficiency is moderate some or all of the characteristic symptoms, small leaves, rosette and interveinal chlorosis, were present except in cherry. Affected trees respond well to zinc sulphate

sprays applied during the late dormant period. Zinc oxide, 2 lb per acre, applied as a foliage spray is recommended as a preventive measure [1180].

Pseudotsuga Carr.

PINACEAE

Evergreen trees of w. N. America and e. Asia.

1. *P. menziesii* (Mirb.) Franco (*P. taxifolia* (Poir.) Britton), Douglas fir, pin Douglas; coastal BC and south to Calif. 1a, *P. m.* var. *glauca* (Beissm.) Franco (*P. taxifolia* var. *g.* (Mayr.) Sudw.); s. interior BC, Alta and south into the US.

Agrobacterium pseudotsugae (Hansbr. & R.E.Sm.) Savul. (*Phytophthora p.* Hansbr. & R.E.Sm.): bacterial gall, tumeur bactérienne: on 1 BC 41:84.
Aleurodiscus amorphus (Pers. ex Fr.) Schroet.: on 1 BC [599].
A. farlowii Burt: on 1 BC [599, 1198].
A. minnsiae Jackson: on 1 BC [496, 1198]; see *Abies*.
A. penicillatus Burt: on 1 BC [599, 1198].
A. spinigei Rogers & Lemke: on 1 BC [599, p. 265].
A. weirii Burt: on 1 BC [599, 1198].
Arceuthobium douglasii Engelm.: dwarf mistletoe, faux-gui: on 1 BC 41:84, [569, 570].
Armillaria mellea (Vahl ex Fr.) Kummer: root rot, pourridié-agaric: on 1 BC 41:84, F54:131, F55:104, [741, 791, 1073, 1198], Alta F54:112; noted on young trees BC F57:70.
Asterodon ferruginosus Pat.: on 1 BC [1198].
Auriscalpium vulgare S.F.Gray: on 1 BC [1199].
Caliciopsis pseudotsugae Fitzp.: canker, chancre caliciopsien: on 1 BC F54:131, [50, 294, 318, 1198].
Chaetomium elatum Kze. & Schm.: on 1 BC [1198].
Chondropodium pseudotsugae W.L.White: canker, chancre chondropien: on 1 BC F58:102, [1162, p. 438; 1203].
Clitocybe decora (Fr.) Gill. and *C. infundibuliformis* (Schaeff. ex Fr.) Quél.: recorded on 1 BC [1198].
Collybia albipilata Pk.: on 1 BC [1199].
C. conigenoides (Ell.) Sacc.: on 1 BC [1198].
Coniophora olivacea (Fr. ex Pers.) Karst.: on 1 BC [1198].
C. puteana (Schum. ex Fr.) Karst.: brown cubical rot, carie brune cubique: on 1 BC [1198].
Corirolellus heteromorphus (Fr.) Bond. & Sing. (*Trametes heteromorpha* (Fr.) Bres.): brown cubical rot, carie brune cubique: on 1 BC [791, 1198].
C. serialis (Fr.) Murr. (*Trametes s. Fr.*): brown cubical rot, carie brune cubique: on 1 BC [1198].
C. variiformis (Pk.) Sarkar (*Trametes v. Pk.*): brown cubical rot, carie brune cubique: on 1 BC [1198]; from 1 BC [791].
Corticium bicolor Pk. and *C. furfuraceum* Bres.: on 1 BC [1198].
C. fuscostratum Burt: brown cubical rot, carie brune cubique: from 1 BC F58:102, [1203]; see *Picea*.
C. galactinum (Fr.) Burt: white stringy rot, carie blanche filandreuse: on 1 BC [1198]; see *Abies*.
C. inopinatum Jackson: on 1 BC F58:102, [1203].
C. pelliculare Karst.: on 1 BC [1198]; see *Abies*.
C. propinquum Jacks. & Dearden: on 1 BC [1198]; a *Gloeocystidiellum*, fide Weresub.

C. pseudotsugae Burt [*Xenasma filicinum* (Bourd.) Christiansen]: on 1 BC [1198].
C. radiosum Fr.: on 1 BC [1198]; see *Abies*.
C. rillum Jackson: on 1 BC [1198]; see *Acer*.
C. testatum Jacks. & Dearden: on 1 BC type [499, p. 151; 1198].
C. tulasnellodeum Höhn. & Litsch. [*Xenasma t.* (Höhn. & Litsch.) Donk]: on 1 BC [1198].
C. versatum (Burt) Rogers & Jacks.: on 1 BC [1198].
Crepidotus herbarum Pk.: on 1 BC [1198].
Cytospora friesii Sacc.: canker, chancre cytosporéen: on 1 BC [253].
Dacryomitra nuda (Berk. & Br.) Pat.: on 1 BC [1198].
Dasyscyphus ciliatus Hahn (*Lachnella ciliata* (Hahn) Seav.): on 1 BC [402, p. 142; 979; 1199].
D. pseudotsugae Hahn (*Lachnella p.* (Hahn) Seav.): canker, chancre dasyscyphéen: on 1 BC F54:131, [402, p. 140; 979, 1198].
Durandiella pseudotsugae Funk (stat. conid *Chondropodium pseudotsugae*, q.v.): on 1 BC [317, p. 332].
'Echinodontium tinctorium' Ell. & Ev. (*Fomes tinctorius* Ell. & Ev.): brown stringy rot, carie brune filandreuse: from 1 BC [1203].
Fomes annosus (Fr.) Karst.: white pocket rot, maladie du rond: on 1 BC 41:84, [1198]; from 1 BC [791, 1073]; for characters in culture, see [791].
F. nigrolimitatus (Rom.) Egeland: white pocket rot, carie blanche alvéolaire: on 1 BC [1198].
F. officinalis (Vill. ex Fr.) Neuman: brown cubical rot, carie brune cubique: on 1 BC [1198], Alta F53:131; from 1 BC [791, 1073].
F. pini (Brot. ex Fr.) Karst.: red ring rot, carie blanche alvéolaire: on 1 BC [1198], Alta F53:129; from 1 BC [1073], Alta F57:141; on 1a BC F53:152; most common trunk rot of 1 in interior BC, F53:153.
F. pinicola (Sw. ex Fr.) Cke.: brown cubical rot, carie brune cubique: on 1 BC [740, 1198]; from 1 BC F52:145, [1073]; common on felled trees BC F57:83.
F. repandus Overh.: brown cubical rot, carie brune cubique: on 1 BC [1198].
F. robustus Karst.: white spongy rot, carie blanche filandreuse: on 1 BC [1198].
F. roseus (Alb. & Schw. ex Fr.) Karst.: brown cubical rot, carie brune cubique: on 1 BC [1198]; from 1 BC [791].
F. subroseus (Weir) Overh.: brown cubical rot, carie brune cubique: on 1 BC [1198]; from 1 BC [745, 791, 1073]; see *Abies*.
Fusarium spp., etc.: damping-off, fonte des semis: *F. avenaceum* (Fr.) Sacc., *F. oxysporum* Schlecht., *F. sambucinum* Fckl., *Gliocladium roseum* (Lk.) Bainier, *Mucor racemosus* Fres., *Pythium* spp., *Rhizoctonia solani* Kühn were isolated from infected seedlings BC 41:84.
F. oxysporum f. *pini* Hartig: on 1 BC [1198].
Ganoderma applanatum (Pers. ex Wallr.) Pat.: white mottled rot, carie blanche madrée: on 1 BC [1198]; from 1 BC [791, 1073].
G. oregonense Murr.: on 1 BC [1198].
Gloeocystidiellum lividocaeruleum (Karst.) Donk (*Corticium l.* Karst., *Aleurodiscus lividocoeruleus* (Karst.) Lemke): on 1 BC [599, 1198].
Gyromitra esculenta (Pers. ex Fr.) Fr.: on 1 BC [1198].
Hymenochaete fuliginosa (Pers.) Bres. and *H. tabacina* (Sow. ex Fr.) Lév.: on 1 BC [1198].
Hymenula sp.: on *Rhabdocline pseudotsugae* (q.v.) on 1 BC F58:103.

Pseudotsuga

- Lenzites saepiaria* (Wulf. ex Fr.) Fr.: white pocket rot, carie blanche alvéolaire: from 1 BC F57:83, [744]; on 1 BC [1198].
- Limacinia alaskensis* Sacc. & Scalia: sooty mold, fumagine: on twigs and needles of 1 BC [51, 1198].
- L. moniliforme* (Fraser) Barr var. *quinqueseptata* Barr: sooty mold, fumagine: on branches of 1 BC [51, 1198].
- Lophium mytilinum* (Pers.) Fr.: associated with *Dasyscyphus* sp. on wound cankers of 1 BC F57:86, [1203].
- Melampsora albertensis* Arth.: needle rust, rouille des aiguilles: 0 I on 1 BC 42:95, 53:110, F54:133, Alta F52:123; on current season's needles and cone bracts of 1 BC Alta. Ziller [1197] was the first to distinguish the *Caeoma* state from that of *M. occidentalis* and show the connection with the rust on *Populus tremuloides*.
- M. occidentalis* Jackson (*Caeoma occidentale* Arth.): needle rust, rouille des aiguilles: 0 I on current season's needles of 1 BC Alta [1197]; on 1 BC F52:151, 53:110, Alta F53:131.
- Merulius himantioides* Fr.: brown cubical rot, carie brune cubique: on 1 BC [1198]; from 1 BC [1073]; see *Abies*.
- M. lacrymans* Wulf. ex Fr.: from 1 BC [1198]; see *Abies*.
- Naematoloma fasciculare* (Huds. ex Fr.) Karst.: recorded on 1 BC [1198].
- Odontia barba-jovis* Fr.: on 1 BC [1198]; see *Abies*.
- O. bicolor* (Alb. & Schw. ex Fr.) Quél.: white stringy rot, carie blanche filandreuse: on or from 1 BC [792, 1073].
- O. lactea* Karst.: on 1 BC [1198].
- Paxillus atrotomentosus* (Batsch ex Fr.) Fr. and *P. panuoides* (Fr. ex Fr.) Fr.: on 1 BC [1198].
- Pellicularia isabellina* (Fr. ex Pers.) Rogers: on 1 BC [1198].
- P. subcoronata* (Höhn. & Litsch.) Rogers: on 1 BC [1198]; see *Abies*.
- Peniophora calothrix* (Pat.) Rogers & Jacks. [*Tubulicrinis* c. (Pat.) Donk]: on bark of 1 BC [1152].
- P. carnosa* Burt and *P. crassa* Burt ex Pk.: on 1 BC [1198].
- P. gigantea* (Fr.) Masee: white sap rot, carie blanche de l'aubier: on 1 BC [1198]; see *Abies*.
- P. gracillima* Ell. & Ev.: on 1 BC [1198]; see *Abies*.
- P. humifaciens* Burt: on 1 BC [1198].
- P. phlebioides* Jacks. & Dearden: on 1 BC type [499, p. 150; 1198]; a sap-rot fungus BC F57:83; see *Pinus*.
- P. pseudo-pini* Weresub & Gibson (*Stereum pini* auct. Am.): brown ray rot, carie brune rayonnante: from 1 BC [793, 1073].
- P. resinosa* Jacks. & Dearden: on 1 BC [499, p. 147; 1198].
- P. sanguinea* (Fr.) Höhn. & Litsch.: on 1 BC [1198].
- P. separans* Burt: on 1 BC [1198]; see *Abies*.
- P. septentrionalis* Laurila: red heartrot, carie rouge du cœur: on or from 1 BC F58:102, [793, 1203].
- P. subalutacea* (Karst.) Höhn. & Litsch.: on 1 BC [1198].
- P. tenuis* (Pat.) Masee: on 1 BC [1198]; see *Abies*.
- Phacidium abietis* (Dearn.) Reid & Cain (not *P. infestans* Karst.): on 1 BC F59:109, F60:91, [875, p. 482].
- Phaeocryptopus gaeumannii* (Rohde) Petr. (*Adelopus* g. Rohde): needle cast, rouge: on 1 BC 41:84, F52:151, [50, 1198]; severe and widespread in 1954 but not in 1955, F55:103.
- Pholiota aeruginosa* Pk.: on 1 BC [1198].
- P. aurivella* (Batsch ex Fr.) Kummer (*P. adiposa* auct. Am.): brown mottled rot, carie brune madrée: from 1 BC [791].
- Phomopsis lokoyae* Hahn: canker, chancre phomopsien: on 1 BC 41:84, [1198]; outbreaks of epidemic proportions occur only at irregular intervals [1070].
- Pleurotus mitis* (Pers. ex Fr.) Quél. and *P. porrigens* (Pers. ex Fr.) Kummer: on 1 BC [1198].
- Polyporus abietinus* Dicks. ex Fr.: pitted sap rot, carie blanche de l'aubier: on 1 BC [1198]; from 1 BC F52:145, F57:83, [1073].
- P. amorphus* Fr.: on 1 BC [1198].
- P. anceps* Pk.: from 1 BC [791]; on 1 BC [1198]; a sap-rot fungus, F57:83.
- P. balsameus* Pk.: brown cubical rot, carie brune cubique: from 1 BC [1198]; from fire-scarred trees, F55:104.
- P. caesius* Schrad. ex Fr.: recorded on 1 BC [1198].
- P. elegans* Bull. ex Fr.: on 1 BC [1198].
- P. fibrillosus* Karst., *P. fragilis* Fr. and *P. guttulatus* Pk.: on 1 BC [1198].
- P. hirtus* Quél.: brown cubical rot, carie brune cubique: on 1 BC [1198].
- P. leucospongia* Cke. & Harkn.: on 1 BC [1198].
- P. mollis* Pers. ex Fr.: white stringy rot, carie blanche filandreuse: from 1 BC [791, 1073, 1198].
- P. osseus* Kalchbr., *P. perdelicatus* Murr. and *P. perennis* L. ex Fr.: on 1 BC [1198].
- P. pubescens* Schum. ex Fr.: from 1 BC [1198].
- P. resinus* Schrad. ex Fr.: brown cubical rot, carie brune cubique: on 1 BC [1198].
- P. schweinitzii* Fr.: brown cubical rot, carie brune cubique: on 1 BC F51:148, [1198]; from 1 BC [791, 1073]; prevalent in the BC interior, F53:153, and on fire-scarred trees, F55:104.
- P. sulphureus* Bull. ex Fr.: brown cubical rot, carie brune cubique: on 1 BC [1198]; from 1 BC [1073].
- P. tomentosus* Fr.: red butt rot, carie rouge alvéolaire du pied: from 1 BC [1198].
- P. tomentosus* var. *circinatus* (Fr.) Sartory & Maire (*P. c.* Fr.): red butt rot, carie rouge alvéolaire du pied: on 1 BC [1198]; from 1 BC [1073], Alta F51:141.
- P. undosus* Pk.: on dead 1 BC F53:155, [1198].
- P. volvatus* Pk.: on 1 BC [1198]; from 1 BC [1073]; from a sporophore BC [795].
- Poria albipellucida* Baxt.: causes a white laminate rot: on 1 BC [1198]; from 1 BC [791, 795, 1073].
- P. albolutescens* (Rom.) Egel., *P. aneirina* (Sommerf.) Cke., and *P. candidissima* (Schw.) Cke.: on 1 BC [1198].
- P. carbonica* Overh.: brown rot, carie brune: on 1 BC [813, p. 204; 1198]; on or from 1 BC [790, 791, 1073].
- P. cinerascens* Bres.: on 1 BC [1198].
- P. cocos* (Schw.) Wolf: white spongy rot, carie blanche spongieuse: from 1 BC [1198].
- P. ferrea* (Pers.) Bourd. & Galz.: white rot, carie blanche: from 1 BC [791]; on 1 BC [1198].
- P. lenis* (Karst.) Sacc.: on 1 BC [1198].
- P. monticola* Murr. (*P. microspora* Overh.): from build-material of 1 in Ont [790, 791]; from 1 BC [1073]; on 1 BC [1198].
- P. mutans* Pk.: recorded on 1 BC [1198].
- P. nigrescens* Bres.: on 1 BC F61:125.
- P. pulchella* (Schw.) Cke. [*P. tenuis* (Schw.) Cke. var. *p.* (Schw.) Lowe]: on 1 BC [1198].
- P. sericeomollis* (Rom.) Egel. (*P. asiatica* (Pilát) Overh.): on 1 BC [1198]; from 1 BC [1073].

Poria subacida (Pk.) Sacc.: white spongy rot, carie blanche spongieuse: on 1 BC [1198]; from 1 BC 791, 1073].

P. subiculosa (Pk.) Cke.: on 1 BC [1198].

P. subincarnata (Pk.) Murr.: from 1 BC [1198].

P. versipora (Pers.) Rom.: on 1 BC [1198].

P. weirii Murr.: yellow ring rot, carie jaune annelée: on 1 BC [1198]; from 1 BC [741, 791, 1073], F52:145; important on second-growth trees on the coast, 41:84, F54:130. The 'annual' form occurs in BC on 1, *Thuja plicata* and other conifers, but it is rarely isolated from the latter hosts beyond the natural distribution of 1; the 'perennial' form is known only from *T. plicata* [150].

P. xantha (Fr. ex Lind) Cke.: brown cubical rot, carie brune cubique: on 1 BC [1198]; from 1 BC [791, 1073].

Pseudohydnum gelatinosum (Fr.) Karst.: recorded on 1 BC [1198].

Radulum obiculare Fr.: on 1 BC [1198].

Retinocyclus abietis (Crouan) Groves & Wells: leader dieback, dépérissement de la flèche: on 1 BC [383, p. 870; 1199], F57:86.

Rhabdocline pseudotsugae Syd.: needle cast, rouge: on 1 BC 41:84, 48:101, F52:145, [1198], Alta F54:112; a major problem in the use of 1 for Christmas trees, F58:99.

Rhabdogloeum pseudotsugae Syd.: on 1 BC 42:95, F54:131, [1198], Alta F54:112; apparently a secondary fungus closely associated with *Rhabdocline*.

Rosellinia herpotrichioides Hepting & Davidson: needle blight, brûlure des aiguilles: on 1 BC F55:106.

Russula abietina Pk., *R. fragilis* (Pers. ex Fr.) Fr. and *R. lutea* (Huds. ex Fr.) S.F.Gray: recorded on 1 BC [1198].

Scytinostroma arachnoideum (Pk.) Gilbertson (*Corticium quaesitum* Jacks. & Dearden): on 1 BC type [499, p. 154; 1198].

Septogloeum gillii Ell.: on *Arceuthobium douglasii* on 1 BC [570].

Sparassis radicata Weir: root rot, pourridié sparassien: on or from 1 BC F52:151, [1198].

Steccherinum ochraceum (Fr.) S.F.Gray: on 1 BC [1198].

Stereum abietinum (Pers. ex Fr.) Fr.: brown cubical rot, carie brune cubique: from 1 BC [1073].

S. chailletii (Pers. ex Fr.) Fr.: white stringy rot, carie blanche fillandreuse: on 1 BC [1198]; from 1 BC F57:83, [1073]; see *Abies*.

S. ostrea Blume & Nees ex Fr. and *S. purpureum* (Pers. ex Fr.) Fr.: on 1 BC [1198].

S. sanguinolentum (Alb. & Schw. ex Fr.) Fr.: red heart-rot, carie rouge du sapin: on 1 BC [1198]; from 1 BC F57:83, [791, 1073], Alta F51:141.

Tomentella ferruginosa (Höhn. & Litsch.) Sacc. & Trott. and *T. fusca* (Fr.) Schroet.: on 1 BC [1198].

Trametes carbonaria (Berk. & Curt.) Overh.: on 1 BC [1198].

T. odorata Fr. (*T. americana* Overh.): brown cubical rot, carie brune cubique: on 1 BC [1198]; from 1 BC [791].

T. tenuis Karst.: on 1 BC [1198].

Trechispora brinkmanni (Bres.) Rogers & Jacks.: white stringy rot, carie blanche filandreuse: on 1 BC [1198]; from 1 BC [1073].

Tremella encephala Pers.: on 1 BC [1199].

T. foliacea Pers. ex Fr.: on 1 BC [1203].

Trogia crispa Fr.: on 1 BC [1198].

Tympanis pseudotsugae Groves: canker, chancre tym-

panien: on 1 BC [372, p. 588]; from 1 BC F58:102, [1203].

Valsa abietis Fr.: canker, chancre cytosporéen: on 1 BC F55:106, [1198].

V. pini (Alb. & Schw.) Fr.: on 1 BC [50].

Vararia granulosa (Pers. ex Fr.) Laurila: on 1 BC [1198].

Verticicladiella abietina (Pk.) Hughes: in beetle gallery and bark of 1 BC [553].

V. brachiata W.B.Kendr.: from 1 BC [553, p. 786].

Wallrothiella arceuthobii (Pk.) Sacc.: on *Arceuthobium douglasii* (q.v.): on 1 BC F61:125, [570].

Xeromphalina campanella (Batsch ex Fr.) Kühner & Maire (*Omphalia c.* (Batsch ex Fr.) Qué.) white stringy rot, carie blanche spongieuse: on 1 BC [1198]; from 1 BC [1073].

Psoralea L.

LEGUMINOSAE

Perennial herbs of N. and S. America, Africa and Australia.

1. *P. argophylla* Pursh; in Canada from Man to Alta.
2. *P. esculenta* Pursh, Cree turnip, navet de prairie; in Canada from Man to Alta.
3. *P. lanceolata* Pursh, scurf pea; in Sask and Alta.

Dicoccum psoraleae Ell. & Barth.: on 1 Man [93, p. 116].

Gloeosporium psoraleae Pk. [*Colletotrichum p.* (Pk.) Arx, 15a, p. 125]: on leaves of 2 Man [93, p. 130].

Septoria argophylla Ell. & Kell.: on 1 Man [93, p. 137].

Uromyces psoraleae Pk. (*U. p.* var. *argophyllae* (Seym.) Arth., *U. p.* var. *psoraleae*): 0 I III on 1, 3 Sask [93, p. 73]; on 1 Sask 32:106, 34:107, [cf. 15, p. 244].

Pteretis Raf.

POLYPODIACEAE

Ferns of the north temperate regions.

1. *P. pensylvanica* (Willd.) Fern. (*P. nodulosa* (Michx.) Nieuwl., *Matteucia struthiopteris* auct. Am.), fiddle heads; in Nfld and NS and from Que to Alaska.

Ceratobasidium anceps (Bres. & Sacc.) Jackson: on 1 Ont [495].

Cyphella capula (Holmskj.) Fr.: on old fronds of 1 Man [93, p. 76].

Dasyscyphus carestianus (Rabh.) Sacc.: on old fronds of 1 Man [93, p. 39].

Dothidella osmundae (Pk. & Clint.) Sacc.: on 1 NS [1138].

Leptothyrium litigiosum (Desm.) Sacc.: on dead 1 Man [93, p. 134].

Solenia filicina Pk.: on dead 1 Man [93, p. 78].

Taphrina struthiopteridis Nishida: on fronds of 1 Man [93, p. 34].

Uredinopsis struthiopteridis Störmer ex Diet.: II¹ II² III on 1 BC F55:105, [1198], Alta Man Ont Que NS PEI Nfld [289], Alta Que NS Nfld [15, p. 4], Man [93, p. 64], Ont [816], NS [1138].

Pteridium Gleditsch POLYPODIACEAE

One or a few species of fern found in most tropical and temperate regions.

1. *P. aquilinum* (L.) Kühn, bracken; in Africa and Europe. 1a, *P. a.* var. *latiusculum* (Desv.) Underw.; Nfld, NS and Que to Man. 1b, *P. a.* var. *pubescens* Underw. (*P. a.* var. *lanuginosum* (Bong.) Fern., non (Bory) Kühn); Alaska to Mexico and also in Ont and Que.

Ceratobasidium anceps (Bres. & Sacc.) Jackson (stat. sclerot. *Sclerotium deciduum* Davis): on 1a Ont Que; the hosts in N. America of and the symptoms produced by this parasitic species are described [495, p. 243].

Cryptomycina pteridis (Reb. ex Fr.) Höhn. (*Cryptomyces p.* (Reb. ex Fr.) Rehm; stat. conid. *Fusidium p.* Kalchbr.): on 1a Man Ont [93, p. 42], Que 32:106, [197], NS PEI [1138]; on 1b Alaska [175].

Dothidella osmundae (Pk. & Clint.) Sacc.: on 1a NS [1138].

Mycosphaerella indistincta (Pk.) Lindau: on 1 BC [50].

Uredinopsis hashiokai Hirats. (*U. aspera* Faull): II III on 1b BC [289, p. 80; 1197, 1198].

U. pteridis Diet. & Holw. (*U. macrosperma* (Cke.) Magn.): II III on 1b BC [15, p. 5; 289, 1198]; the short-spored form occurs only in the coastal region, whereas the long-spored form is more widespread [1197].

Puccinellia Parl. GRAMINEAE

Annual or perennial grasses of temperate and cold regions.

1. *P. angustata* (R.Br.) Rand & Redf. (*Glyceria a.* (R.Br.) Vasey); Frank and Greenl.
2. *P. borealis* Swallen; Alaska and Yukon.
3. *P. bruggemannii* Th.Sør.; Frank.
4. *P. distans* (L.) Parl. (*Glyceria d.* (L.) Wahl.); locally in Canada in NB, Ont, Man and BC; naturalized from Europe.
5. *P. langeana* (Berl.) Th.Sør.; Greenl to Alaska.
6. *P. maritima* (Huds.) Parl. (*Glyceria m.* (Huds.) Wahl.); NS, NB and Que.
7. *P. nutkaensis* (Pres.) Fern. & Weath.; Alaska to Calif.
8. *P. nuttalliana* (Schultes) Hitchc. (*P. airoides* (Nutt.) Wats. & Coult.); Man to BC and Alaska.
9. *P. paupercula* (Holm) Fern. & Weath.; Greenl, Labr, Nfld and Que; also e. Asia. 9a, *P. p.* var. *alaskana* (Scribn. & Merr.) Fern. & Weath. (*P. pumila* (Vasey) Hitchc.); Labr and Que; Alaska to BC.
10. *P. phryganodes* (Trin.) Scribn. & Merr. (*Glyceria vilfoidea* auct.), *G. maritima* f. *vilfoidea* auct.); Alaska, Mack, Keew, Greenl, Labr and Que.

11. *P. tenella* (Lange) Th.Sør. (*Glyceria t.* Lange).

12. *P. vaginata* (Lange) Fern. & Weath.; Yukon, Mack, Keew, Man and Greenl.

Other hosts: 13, *P. arctica* (Hook.) Fern & Weath. (*Glyceria a.* Hook., *P. groenlandica* Th.Sør.). 14, *P. hauptiana* Krecz. 15, *P. tenuiflora* (Grisb.) Scribn. & Merr.

Arthrimum puccinioides (DC.) Kze. (*Goniosporium p.* (DC.) Lk.): on 10 Greenl [603].

Botrytis cinerea Pers.: on 1 Frank [971].

Cladosporium graminum Cda.: on 1 Greenl [600]; on 12 Greenl [899].

Claviceps purpurea (Fr.) Tul.: on 7 Alaska [1042].

Didymosphaeria (*Massariopsis*) *wulfi* Lind: on dead stems of 1 Greenl [602, p. 296].

Erysiphe graminis DC. ex Mérat: on 1 Frank [971]; on 2 Alaska [175, 1037].

Fusarium equiseti (Cda.) Sacc. and *F. nivale* (Fr.) Ces.: on 2a Alaska [1037, 1038].

Hendersonia arundinacea (Desm.) Sacc.: on 1 Frank [604].

Leptosphaeria microscopica Karst.: on 6 Greenl [601].

L. vagans Karst.: on 1 Greenl [601].

Leptostroma marginatum Schw.: on 13 Greenl [899].

Lophodermium arundinaceum (Schrad. ex Fr.) Chev.: on 4 Frank [903]; on 6, 10 Greenl [899]; on 7 Alaska [1038]; on 10 Greenl [604].

L. arundinaceum var. *alpinum* Rehm: on 3 Frank Keew [959].

Mycosphaerella tassiana (de Not.) Johans. (*Sphaerella t.* de Not.): on ?P. sp. (as *Glyceria* sp.), 10 Greenl [901]; on 1, 10 Greenl [601, 602, 603]; on 4, 11 Greenl [903]; on 1 Frank, 10 Greenl, 11 Alaska [604]; on 6 var. *reptans* Frank [600]; on 8 BC [50]; on 10 Greenl [899]; on 11 Alaska [175].

M. tassiana var. *tassiana*: on 5, 10 Frank [52].

M. tulasnei (Jancz.) Lindau: on 9a Alaska [1038].

M. wichuriana (Schroet.) Johans.: on 1 Greenl [601].

Passalora graminis (Fckl.) Höhn. (*Scolecotrichum g.* Fckl.): on P. sp. Alaska [1038]; on 9a Alaska [1037].

Platyspora pentamera (Karst.) Wehm. (*Clathrospora p.* (Karst.) Berl.): on 1 Greenl [602]; on 11 Alaska [175, 604].

P. planispora (Ell.) Wehm. (*Clathrospora p.* (Ell.) Berl.): on 10 Frank [52].

Pleospora magnusiana Berl.: on 1 Frank [604].

Puccinia recondita Rob. ex Desm. (*P. rubigo-vera* Wint.): II III on P. sp. Alaska [175]; on P. sp., 7 Alaska [1037]; on 6 NS 51:41, [1138]; on 6 NS, 7 Alta, 15 Sask [15, p. 179, 180]; on 27 Man, 15 Sask [93, p. 71]; on 7 Alaska [1038].

Pyrenophora trichostoma (Fr.) Fckl.: on 2 Alaska [175, 1037].

Selenophoma donacis (Pass.) Sprague & Johnson var. *stomaticola* (Bäuml.) Sprague & Johnson: on 9a Alaska [1037, 1038].

S. everhartii (Sacc. & Syd.) Sprague & Johnson: on 14 BC [1042].

Septoria arundinis (Mont.) Sacc.: on 10 Greenl [899].

Spermospora subulata (Sprague) Sprague: on 14 BC [1042].

***Pyracantha* Roem.**

ROSACEAE

Woody evergreen shrubs of s.e. Europe and Asia.

1. *P. coccinea* Roem. (*Cotoneaster pyracantha* (L.) Spach), fire-thorn, buisson ardent; native to Europe, cult. for its attractive clusters of fruit.

Spilosea pyracanthae (Oth) Arx (*Fusicladium p.* Oth): scab, tavelure: on 1 BC 31:83, 34:84, 58:106, Ont 53:110; causes considerable defoliation and disfigurement of the fruit in coastal BC.

***Pyrola* L.**

PYROLACEAE

Low, smooth, perennial herbs of the northern hemisphere.

1. *P. aphylla* Smith; BC to Calif.
2. *P. asarifolia* Michx., pink wintergreen; Nfld and PEI to Yukon. 2a, *P. a.* var. *purpurea* (Bunge) Fern. (*P. a.* var. *incarnata* (Fisch.) Fern., *P. uliginosa* Torr. & Gray); Nfld and NS to Alaska.
3. *P. bracteata* Hook.; BC to Calif.
4. *P. elliptica* Nutt., shin-leaf; Nfld and NS to BC.
5. *P. grandiflora* Radius; arctic N. America to Nfld, Que, Ont, Man and Mack.
6. *P. minor* L., wintergreen; Greenl, Lab, Nfld and NS to Alaska.
7. *P. picta* Smith; BC to Calif.
8. *P. rotundifolia* L., wintergreen, muguet des bois; Greenl to Nfld, Que and NS. 8a, *P. r.* var. *americana* (Sweet) Fern. (*P. a.* Sweet); NS, Que and Ont.
9. *P. secunda* L.; Nfld and NS to Alaska and Eurasia. 9a, *P. s.* var. *obtusata* Turcz.; Greenl, Labr, Nfld and NS to Alaska.
10. *P. virens* Schweigg. (*P. chlorantha* Sw.); Labr, Nfld and NS to Alaska, BC and Ore; also Eurasia.

Actinonema pirolae Allesch.: on 5 Frank [604].

Ceratobasidium anceps (Bres. & Syd.) Jackson: on ? Ont [495].

Chrysomyxa pirolata Wint. (*C. pyrolae* (DC.) Rostr., *Melampsora p.* (DC.) Arth.): II III on 1 BC [1198]; on 2 Alaska [175], BC Sask [15, p. 32], Sask [93, p. 62], Man [947]; on 2a Alaska [175], Alaska NS [15]; on 3 Alaska [175], Alaska BC [15], BC [1198]; on 4 Alta [15], Man Que NS [947], Ont [828], NS [1138]; on 5 Alaska [955], Yukon Keew Frank [947], Frank [605], Greenl [15, 899, 901]; on 6 Alaska [175], Que [947], Greenl [15, 899]; on 7 BC [958]; on 8 Man [93]; on 8a BC Sask Man

Ont Que [947], Ont 34:107, NS [15, 1138]; on 9 Alaska [175, 955], Alaska Que Nfld [15], BC [1198], BC Mack Alta Man Que [947], Ont [828], NS [1138]; on 10 Alaska [175], BC [955, 1199], Alta [15], Mack Que [947], Ont [828].

Cladosporium herbarum Lk.: on 5 Greenl [899].

Heterosporium variabile Cke.: on 5 Greenl [899].

Leptosphaeria hyperborea (Fckl.) Berl. & Vogl.: on 5 Que [52].

L. marginata Niessl (*Sphaerulina m.* (Niessl.) Kirschst., nom. illegit.): on 9 Alaska [175, cf. 827].

Lophodermium pyrolae Parmelee (non *L. maculare* (Fr.) de Not.): on *P. sp.* Alaska [175]; on 2 Alaska [1038]; on 2 Alaska, 3, 7 BC, 6 Labr [827, p. 865].

Mycosphaerella minor (Karst.) Johans.: on 9 Que [53].

M. tassiana (de Not.) Johans. (*Sphaerella pachyasca* Rostr.): on 5 Greenl [899; cf. 827].

M. tassiana var. *arthopyrenioides* (Auersw.) Barr.: on 9 Que [53].

Phoma pyrolae (Ehrenb.) Rostr.: on 5 Greenl [602, 899, 901], [cf. 827].

Phyllosticta pyrolae Ell. & Ev.: on 2a Alaska, 3 BC [827].

Pleospora cerastii Oud. (*Pyrenophora c.* (Oud.) Lind): on 5 Greenl [603].

P. comata Auersw. & Niessl. (*Pyrenophora c.* (Niessl.) Sacc.: on 5 Greenl [899].

P. herbarum (Fr.) Rabh.: on 5 Greenl [901].

Pucciniastrum pyrolae Diet. ex Arth. (*Melampsora p.* Schroet.): II III on 2 Alaska [175, 1038], Alaska Alta Man [15, p. 16], BC [1198], BC Mack [827], Sask Man [93, p. 64]; on 2a Alaska [175], BC [1203]; on 3 BC [827, 1198]; on 4 Alta Sask Ont NS [15], Sask [93], NS [1138]; on 5 Mack Keew [827], Greenl [899]; on 6 Alaska [175], BC Yukon Man Que Labr Nfld [827], Alta [15]; on 8 Man [93], ? Alaska [175]; on 9 Alaska [175, 1038], Alaska BC Yukon Mack Keew Sask Man Que Nfld [827], BC [1198], Alta Ont [15]; on 9a Que 33:119; on 10 BC [1203], BC Yukon Mack [827], Alta Man [15], Man [93].

Septoria ellisiana Sacc.: on 9 Ont [827].

S. pyrolata Rostr.: on 5 Greenl [603; 900, p. 626], [cf. 827].

Sphaerella pyrolae Rostr.: on 5 Greenl [899, p. 551]; ? on leaves of *P. sp.* Man [93, p. 53].

***Pyrus* L.**

ROSACEAE

Deciduous, rarely half-evergreen trees or shrubs of Eurasia; one species cult. for its fruits.

1. *P. calleryana* Dcne.; China.
2. *P. communis* L., common pear, poirier; Europe and w. Asia; long cult. for its fruits.
3. *P. longipes* Coss. & Dur.; Algeria.
4. *P. pashia* D.Don; the Himalayas and w. China.
5. *P. ussuriensis* Maxim.; n.e. Asia.

Agrobacterium tumefaciens (Sm. & Towns.) Conn (*Bacillus t.* Sm. & Towns.): crown gall, tumeur du collet: on 2 Ont 24:28, 41:75.

Botrytis cinerea Pers.: gray mold, moisissure grise: from dead twigs of 2 BC 47:86; on fruit in storage BC

Pyrus

- 34:66, [535]; from damped-off seedlings in greenhouse NS 46:66.
- Coniothyrium* sp.: frequent on buds of 2 Ont [563].
- C. pirinum* (Sacc.) Sheldon: frog-eye spot, tache ocellée: on 4 Man 43:98.
- Cytospora* sp.: canker, chancre cytosporéen: on 2 BC [535].
- Erwinia amylovora* (Burr.) Winsl. et al. (*Bacillus amylovorus* (Burr.) Trev.): fire blight, brûlure bactérienne: on *P. sp.* Man 53:100; on 2 BC Ont Que NS 24:28, BC [535], Sask 61:90, NB 26:16, PEI 29:53, 54:109, [cf. 1138]; on 5 Alta 41:64.
- Fire blight is the most important single disease of pear. Whenever blight is epidemic many trees are so severely infected that they must be removed and others are seriously deformed. The disease is epidemic from time to time BC 21:29, 22:40, 34:65, 47:86, Ont 33:53, 44:84, 56:102. In the BC interior the persistent clean-up campaign waged by the provincial Department of Agriculture to remove overwintering cankers provided some measure of protection, 41:75. However, an epidemic in the Creston Valley that began in 1947 was not brought under control until 1952, 53:92, and the epidemic noticeably reduced fruit production, 51:88.
- Spraying with streptomycin sulphate at blossom time gave a measure of control Ont 55:102, 57:97. There is a distinct possibility that some reports of fire blight based on symptoms concern the activity of *Pseudomonas syringae* (q.v.) rather than *E. amylovora*. When an outbreak of blossom blight spreads very rapidly, the cause should be checked by isolation of the pathogen. Too little is known of the canker phase of blast to permit the symptoms caused by the two pathogens to be distinguished.
- Fabraea maculata* Atk. (stat. conid. *Entomosporium maculatum* Lév.): leaf blight or fruit spot, entomosporiose: on 2 BC 28:46, BC PEI 33:54, Ont 53:92, Que 57:97; on *P. sp.* Sask Man [93, p. 130]; see *Amelanchier*.
- Fumago vagans* Pers., sensu Fant.: on buds and bark of 2 Ont [563].
- Gloeodes pomigena* (Schw.) Colby: sooty blotch, tache de suie: on 2 Ont 53:92, 54:109, 62:75.
- Gloeosporium album* Osterw. [*Phlyctaena vagabunda* Desm.]: storage rot, anthracnose d'entrepot: on 2 NB 45:89.
- Gymnosporangium clavariiforme* (Pers.) DC.: rust, rouille: 0 I on 1 NS 53:92; on 2 Ont 57:97, NS 39:90, [1138].
- G. clavipes* (Cke. & Pk.) Cke. & Pk.: on 2 NS 41:75, [1138].
- G. fuscum* DC.: trellis rust, rouille grillagée du poirier: on 2 Victoria, BC [1205], (as *G. sp.*) [535], (as *G. clavariiforme*) 59:71.
- Leptothyrium pomi* (Mont. & Fr.) Sacc.: fly-speck, moucheture: on 2 Ont 38:85, 55:103 et seq.
- Monilinia fructicola* (Wint.) Honey (*Sclerotinia f.* (Wint.) Rehm): brown rot, pourriture brune: on 2 Ont 54:19, NS 51:89.
- M. laxa* (Aderh. & Ruhl.) Honey (*Sclerotinia l.* Aderh. & Ruhl.): blossom and twig blight, pourriture brune: on 2 BC 47:86.
- Mycosphaerella sentina* (Fr.) Schroet. (stat. conid *Septoria piricola*, q.v.): leaf spot, tache septorienne: on 2 Man 44:85, Ont NS 24:28, Ont 32:75, 57:98, NS 59:71, PEI 26:15, [cf. 1138].
- Myxosporium corticola* Edg.: canker, chancre: on 2 BC 61:90; a record unsupported by a specimen.
- Nectria galligena* Bres.: European canker, chancre européen: on 2 BC 46:66, 49:81, [50].
- Neofabraea malicorticis* Jackson: anthracnose, anthracnose: on 2 BC 30:71; unreported by Jones [535].
- Phialophora* [?*malorum* (Kidd. & Beaum.) McCulloch]: side rot, pourriture phialophoréenne: on fruit of 2 BC 62:75.
- Phyllosticta pyrina* Sacc.: on 2 NS [1138].
- P. pyrorum* Cke.: on 2 NS 25:33, [cf. 1138].
- Phytophthora cactorum* (Leb. & Cohn) Schroet: collar rot, mildiou du collet: on 2 BC 57:97; on fruit of 2 BC 49:81, Ont 54:100, NS 43:83, [1138]; first seen on fruit in NS in 1919, 54:100.
- Podosphaera leucotricha* (Ell. & Ev.) Salm.: powdery mildew, blanc: on 2 BC 24:28; on 5 BC 31:73; common on pear in the BC interior, but rarely causing damage.
- Polyporus radiatus* Sow. ex Fr.: from *P. sp.* Ont [791].
- Pseudomonas syringae* van Hall: pear blast, coulure bactérienne: on 2 BC 54:109, [535], Ont 61:91, 62:75. Pear blast was first noted on Vancouver I. in 1953, but the disease was probably present for several years previously. For the symptoms caused by *P. syringae* and a comparison of the organism with *Erwinia amylovora*, see McKeen [710].
- Rhizopus nigricans* Ehr.: on fruit of 2 in storage, BC 57:97.
- Septoria piricola* Desm.: on 2 Ont 33:119.
- Taphrina bullata* (Berk.) Tul.: leaf blister, cloque des feuilles: on 2, 3 BC [535].
- Trichothecium roseum* (Pers.) Lk.: on scab lesions on 2 NS 47:86.
- Venturia pirina* Aderh. (stat. conid. *Fusicladium pyrorum* (Lib.) Fckl. [478]): scab, tavelure: on 2 BC Ont NS PEI 24:28, BC [50], Que 25:33, NB 26:15. In favorable seasons scab is difficult to control especially on some cultivars. Twig lesions are evidently an important source of primary inoculum, NS 61:91. A dormant spray of lime sulphur is recommended to control infection from these lesions, Ont 57:98.
- Pear corky pit virus: corky pit, point liège: on 2 Flemish Beauty BC [547].
- Pear stony pit virus: stony pit, gravelle: on 2 BC 39:90 et seq., Ont 45:90, 47:87.
- Anjou pit, tache de L'Anjou: on 2 BC 39:89, 59:71, cause unknown, but apparently in part caused by a virus; on 2 Ont 62:76.
- Bitter pit, point amère: on 2 BC 41:76, 49:81, cause unknown.
- Black end, pourriture apicale: on 2 BC 31:73 et seq., cause unknown.
- Boron deficiency, carence de bore: drought spot, corky core or dieback, liège ou dépérissement: on 2 BC 24:28, 29:53, 31:73, 38:85, 43:84, 51:89, Ont 44:85, PEI 47:87.
- Chemical injury: from insecticides, on 2 Ont 38:85, 45:104.
- Frost, froid: russetting, roussissement: on 2 Ont 41:76, 57:98.
- Iron deficiency, carence de fer: chlorosis, chlorose: on 2 BC 39:91, 41:76.
- Low temperature, basse température: winter injury, gelure: on 2 BC 25:34, Ont 36:60, 47:87.
- Manganese deficiency, carence de manganèse: interveinal chlorosis, chlorose internervale: on 2 BC [1138].
- Potassium deficiency, carence de potasse: leaf scorch, pyrolose: on 2 Ont 39:91.
- Zinc deficiency, carence de zinc: little leaf or rosette, rosette: on 2 BC 51:88.

Quercus L.

FAGACEAE

Deciduous or evergreen trees or shrubs of the temperate and warm regions of the northern hemisphere. Many are important timber trees and of some the acorns are edible; also planted for ornament.

1. *Q. alba* L., white oak, chêne blanc; in Canada in s. Que and s. Ont. The wood is used in flooring, furniture, interior finishing and for tight cooperage.
2. *Q. dentata* Thunb.; e. Asia.
3. *Q. garryana* Dougl., Garry oak, chêne; in Canada in BC.
4. *Q. macrocarpa* Michx., bur oak, chêne blanc; in Canada from NB and Que to Man and Sask. The wood has the same uses as that of white oak.
5. *Q. palustris* Muncch., pin oak; in Canada in Ont along L. Erie and the Detroit R.
6. *Q. rubra* L. (*Q. borealis* Michx. f. var. *maxima* (Marsh.) Ashe), red oak, chêne rouge; in Canada from PEI and NB to Que and Ont. 6a, *Q. r.* var. *borealis* (Michx. f.) Farw.; NS, Que and Ont.
7. *Q. velutina* Lam., black oak, chêne noire; in Canada in Ont.

- Actinopelte dryina* (Sacc.) Höhn.: leaf spot, tache des feuilles: on 6 Que 54:125, NB F57:25.
- Aleurodiscus acerinus* (Pers. ex Fr.) Höhn. & Litsch.: on bark of 4 Man [93, p. 75].
- A. candidus* (Schw.) Burt: on 3 BC [1198].
- A. griseocanus* (Pers.) Höhn. & Litsch.: on bark of 4 Man [93].
- Amphisphaeria applanata* (Fr.) Ces. & de Not.: on 4 Man [93, p. 52].
- Armillaria mellea* (Vahl ex Fr.) Kummer: root rot, pourridié-agaric: on 3 BC 41:84, [1198].
- Botryosphaeria melanops* (Tul.) Wint.: on 6 Ont [996].
- B. quercuum* (Schw.) Sacc.: on *Q.* sp. Ont Que; on 6 Ont Que; on 6a NS [996].
- Calicium pusillum* (Achar.) Floerke: on fallen fruits of 4 Man [93, p. 38].
- Ciboria batschiana* (Zopf) Buchw. (*Sclerotinia pseudo-tuberosa* (Ell.) Rehm): on acorns of 4 Man [93, p. 42].
- Ciborinia ?candolleana* (Lév.) Whetz. (*Sclerotinia c.* (Lév.) Fckl.): sclerotia on fallen leaves of 4 Man [93, p. 41].
- Colpoma quercina* (Pers.) Wint.: on 1 Ont F59:66.
- Corticium centrifugum* (Lév.) Bres.: on 4 Man [93, p. 75]; see *Abies*.
- C. confluens* (Fr.) Fr. (*C. rubellum* Burt): on 4 Man [93, p. 76].
- C. contiguum* Karst. (*C. crustaceum* (Karst.) Höhn. & Litsch.): on 4 Man [93, p. 75].
- C. galactinum* (Fr.) Burt: on *Q.* sp. Ont [1160]; see *Abies*.
- C. improvisum* Jackson: on decorticated wood of *Q.* sp. Que type [498, p. 720].

- C. leucoxanthum* Bres.: white branch rot, carie blanche des branches: on 3 BC F57:86, [1199]; see *Acer*.
- C. litschaueri* Burt (*C. septentrionale* Burt): on 4 Man [93, p. 76].
- C. praestans* Jackson [*Scytinostroma p.* (Jacks.) Donk]: on bark of decaying down branches of 1 Ont type [494, p. 148].
- Coryneum kunzei* Cda.: on 1 Ont F57:51; on twigs of 4 Man [93, p. 129]; on 6 NB F56:26; see *Pseudo-valsula longipes*.
- C. pustulatum* Pk.: on small twigs of 4 Man [93].
- Cronartium quercuum* (Berk.) Miyabe ex Shirai (*C. cerebrum* Hedge. & Long): rust, rouille: II III on 6 Ont 24:50, 33:120, 34:74, F52:73; on 6, 7 Ont [828].
- Cryptodiaporthe densissima* (Ell.) Wehm.: on 1, 6 Ont F60:67.
- Cyphella ?trachychaeta* Ell. & Ev.: on fallen leaves of 4 Man [93, p. 76].
- Daedalea quercina* L. ex Fr.: on *Q.* spp. Ont [791].
- Dasyscyphus ?cerinus* (Pers.) Fckl.: on twigs of 4 Man [93, p. 39].
- Diaporthe leiphaemia* (Fr.) Sacc. (stat. conid. *Phomopsis quercina* q.v.): on 6 NB F57:25.
- D. leiphaemia* var. *raveneliana* (Thüm. & Rehm) Wehm.: on 1 Ont F60:67.
- D. taleola* (Fr.) Sacc.: on 1 Ont F59:66; on twigs of 4 Man [93, p. 57]; on 6 Ont F60:67.
- Diatrype stigma* Hoffm. ex Fr.: on branches of 4 Man [93, p. 59].
- Didymosphaeria diplospora* (Cke.) Rehm: on branches of 4 Man [93, p. 54].
- Diplodia quercus* Fckl.: on 6 Ont F60:67.
- Discosia artocreas* Tode ex Fr.: on leaves of 4 Man [93, p. 133].
- Dothiorella advena* Sacc.: on 6 Ont F58:60.
- Fenestella amorpha* Ell. & Ev. and *F. princeps* Tul.: on branches of 4 Man [93, p. 57].
- Fistulina hepatica* Schaeff. ex Fr.: on 4 Man [93, p. 81].
- Fomes everhartii* (Ell. & Gall.) Schrenk & Spauld.: on ?*Q.* sp. Ont Que PEI [668]; on 1 Ont F63:69.
- F. ignarius* (L. ex Fr.) Kickx: white trunk rot, carie blanche du tronc: on 1 Ont F54:72; on 1, 4, 7 Ont F55:59; from 6 Ont [791].
- Fusicoccum ellisianum* Sacc. & Syd.: on 3 BC [1198].
- Fusidium aeruginosum* Lk. (*Cylindrium a.* (Lk.) Lindau): very common on fallen leaves of 4 Man [93, p. 116].
- Ganoderma applanatum* (Pers. ex Wallr.) Pat. (*Fomes applanatus* (Pers. ex Wallr.) Gill.): from *Q.* sp Ont [791]; on 6 NS [1138].
- Gloeosporium canadense* Ell. & Ev. [*Discula quercina* (West.) Arx]: on 1 Ont [J. Mycol. 5:153. 1889].
- G. cinerascens* Bubák [*Cryptocline c.* (Bubák) Arx, 15a, p. 73]: on 6 NS F60:33.
- G. quercinum* West. [*Discula quercina* (West.) Arx]: leaf spot, tache des feuilles: on 4 NB F63:37; on 6 NB F56:26.
- Gnomonia quercina* Kleb. (*G. veneta* auct.; stat. conid. *Gloeosporium quercinum*, q.v.): anthracnose, anthracnose: on 1 Ont Que 27:90, 46:79; on 1, 6 Ont F52:75; on 4 Ont 30:80, 46:79, 47:101.
- Helminthosporium ?fusiforme* Cke.: on decayed wood of 4 Man [93, p. 120].
- H. ?macrocarpon* Grev. [*H. ?ciliare* (Pers.) Hughes]: on branches of 4 Man [93].
- Helotium ?albidum* (Rob.) Pat.: on fallen leaves of 4 Man [93, p. 40].

Quercus

- Helotium fructigenum* (Bull.) Karst.: on fallen acorns of 4 Man [93].
- Hydnochaete olivaceum* (Schw.) Banker: on *Q.* sp. NS, 6 NB [1138]; on 6 NS F53:24.
- Hymenochaete curtisii* (Berk.) Morgan: on dead branches of 4 Man [93, p. 77].
- Hypoxylon mediterraneanum* (de Not.) Miller (*Nummularia clypeus* (Schw.) Cke., nom. dub.): on 6 Ont F58:60.
- Lentinus cochleatus* Fr.: on decayed stumps of *Q.* sp. NS [1138].
- Lenzites betulina* (L. ex Fr.) Fr.: on *Q.* sp. NS [1138].
- Marasmius epiphyllus* Fr.: common on fallen leaves of 4 Man [93, p. 91].
- M. felix* Morg.: on fallen leaves of 4 Man [93].
- Marssonina martini* (Sacc. & Ell.) Magn.: leaf spot, tache des feuilles: on 1 Que 39:99; common on 4 Man 44:101, [93, p. 131], Ont 43:98.
- Merulius confluens* Schw. ex Fr.: on 3 BC [1198].
- Metasphaeria querna* Dearn. & Bisby: on dead branches of 4 Man [93, p. 55].
- Microsphaera penicillata* (Wallr. ex Fr.) Lév. (*M. alni* (Wallr.) Salm.): powdery mildew, blanc: on 3 BC 53:110, [50]; on 4 Man 43:98; on 6 Que 56:120, NS F56:26; on 6a NS 51:107.
- M. penicillata* var. *calocladophora* (Atk.) W.B.Cke. (*M. alni* var. *c.* (Atk.) Salm.): on 4 Man [93, p. 44].
- M. penicillata* var. *extensa* (Cke. & Pk.) W.B.Cke. (*M. alni* var. *e.* (Cke. & Pk.) Salm.): on 1 PEI 34:74, [1138].
- Monochaetia taphrinicola* (Ell. & Ev.) Sacc.: on *Q.* sp. Alaska [175].
- Mycoacia himantia* (Schw.) Miller & Boyle: on 3 BC [1198].
- Myxosporium valsoideum* (Sacc.) Allesch.: on *Q.* sp. Alaska [175].
- Odontia crustosa* (Pers.) Quéf.: on 3 BC [1198]; see *Abies*.
- Ostropa cinerea* (Pers.) Fr.: on fallen branches of 4 Man [93, p. 42].
- Panus stipticus* Fr.: on *Q.* sp. Man [93, p. 93].
- Patella sanguinea* (Pers.) Rehm: on old wood of 4 Man [93, p. 41].
- Peniophora amoena* Burt: on 3 BC [1198].
- P. cinerea* (Fr.) Cke.: on 4 Man [93, p. 77].
- P. hydroides* Cke. & Masee, *P. incarnata* (Pers. ex Fr.) Karst. and *P. longispora* (Pat.) Höhn.: on 3 BC [1198].
- P. pubera* (Fr.) Sacc.: on old 4 Man [93, p. 78].
- Pestalotia bicilia* Dearn. & Bisby: on twigs of 4 Man [93, p. 131].
- Phlebia radiata* Fr.: on 3 BC [1199].
- Pholiota squarrosa* (Pers. ex Fr.) Kummer: on *Q.* sp. NS [1138].
- Phomopsis* sp.: on 6a NS 50:117.
- P. quercina* (Sacc.) Höhn. [as *quercinum*]: dieback, dépérissement: on 3 BC 41:84.
- Phyllosticta livida* Ell. & Ev.: on 4 Man 44:101, [93, p. 135].
- P. phomiformis* Sacc.: on 4 Man 45:105, [93, p. 136].
- Polyporus brumalis* Pers. ex Fr.: on fallen branches of 4 Man [93, p. 82].
- P. compactus* Overh.: on 1, 6 Ont [791]; from 6 Ont [795]; on 6 Que F63:49.
- P. cuticularis* Bull. ex Fr.: on and from 3 BC F58:103, [1203].
- P. frondosus* Dicks. ex Fr.: on 6 NS 31:84, [1138].
- P. hirsutus* Wulf. ex Fr.: white spongy rot, carie blanche spongieuse: from and recorded on 3 BC [1198].
- P. obtusus* Berk.: white spongy rot, carie blanche spongieuse: on 6 Ont 36:69; on 6a, but also on 1, 4 Ont; a local concentration at the Petawawa For. Exp. Sta., Chalk River, was recorded by Riley [884]; from 4, 6 Ont [791]; on *Q.* spp. Ont Que, 6 Ont F52:73. From a study of the allelic condition in 24 sporophores from Chalk River, it was concluded that the fungus at this location is not an isolated occurrence of the fungus [271].
- P. pargamensis* Fr.: on 6 Ont F55:62.
- P. planellus* (Murr.) Overh.: on fallen branches of 4 Man [93, p. 83].
- P. pubescens* Schum. ex Fr.: on 4 Man 48:101.
- P. resinosus* Schrad. ex Fr.: rare on stumps of 4 Man [93].
- P. spraguei* Berk. & Curt.: on *Q.* sp. Ont [810].
- P. sulphureus* Bull. & Fr.: brown cubical rot, carie brune cubique: from *Q.* sp. Ont [791]; on 3 BC 41:85, [1198]; on 6 Ont Que 24:50, NS 30:81, [1138].
- P. tulipiferae* (Schw.) Overh.: from *Q.* sp. Ont [791].
- P. versicolor* L. ex Fr.: on 3 BC [1198]; on 4 Man [93, p. 84].
- Poria ferrea* (Pers.) Bourd. & Galz. and *P. versipora* (Pers.) Rom.: on 3 BC [1198].
- Propolis faginea* (Schrad.) Karst.: on wood of 4 Man [93, p. 43].
- Pseudovalsa longipes* (Tul.) Sacc. (stat. conid. *Coryneum umbonatum* Nees, '*C. kunzei*' Cda.): twig curl, ondulation des rameaux: on 1 Ont F60:67; on 6 NS [1138]; stat. conid on 6 NB 56:120.
- Rosellinia ligniaria* (Grev.) Nits.: on branches of 4 Man [93, p. 51].
- Septoria querceti* Thüm.: on 6 Que 32:106.
- Stereum frustulosum* Pers. ex Fr.: on wood of *Q.* sp. NS [1138].
- S. gausapatum* (Fr.) Fr.: on 3 BC [1198]; on ?*Q.* sp. Man [93, p. 78].
- S. hirsutum* (Willd. ex Fr.) S.F.Gray: on *Q.* sp. NS [1138]; on 3 BC [1198].
- S. ostrea* Blume & Nees ex Fr.: on 3 BC [1198].
- Strickeria obducens* (Fr.) Wint. (*Teichospora o.* (Fr.) Fekl.): on bark of 4 Man [93, p. 52].
- Taphrina caerulescens* (Mont. & Desm.) Tul.: leaf blister, cloque des feuilles: on *Q.* sp. PEI 52:106, NS [1138]; on ?1 Que 46:79; on 2 Sask 35:62, [93, p. 34]; on 3 BC 50:117, [535]; on 4 Alta 35:62, 41:85, [735], Man [93]; on 5 Que 49:98; on 6 Alta F60:91; on 6, 7 Ont 25:66; on 6a Que 43:99, Ont 45:105, NB F55:25, NS 47:101, PEI 58:106, not uncommon, but rarely destructive.
- Valsa ambiens* (Pers. ex Fr.) Fr.: on branches of 4 Man [93, p. 57].
- Valsaria insitiva* (Tode) Ces. & de Not.: on branches of 4 Man [93, p. 58].

Ranunculus L.

RANUNCULACEAE

Herbaceous plants of almost worldwide distribution.

1. *R. abortivus* L.; Labr and NS to Alta, BC, Yukon and Alaska.
2. *R. acris* L., tall buttercup, bouton d'or; naturalized from Europe; one of the most

- abundant weeds from Ont eastward and also occurs in Man, Sask, Alta and BC.
3. *R. cardiophyllus* Hook.; Alta, BC and Wash.
 4. *R. cooleyae* Vasey & Rose; Alaska to BC and Wash.
 5. *R. cymbalaria* Pursh (*Halerpestes c.* (Pursh) Greene); Greenl, Labr, Nfld and NS to Alaska; also in S. America and Eurasia.
 6. *R. eschscholtzii* Schlecht.; Alaska to Wash and Oregon; also in e. Asia.
 7. *R. ficaria* L., lesser celandine, ficaire; introduced in cult. from Europe and locally established.
 8. *R. flabellaris* Raf. (*R. delphinifolius* Torr.); Man to BC.
 9. *R. glaberrimus* Hook.; BC to Wash, Calif and Colo.
 10. *R. hyperboreus* Rottb.; Greenl, Nfld and Que to Alta and Alaska.
 11. *R. macounii* Britt.; Labr, Nfld and Que to Alaska.
 12. *R. micranthus* Nutt.; e. US.
 13. *R. nivalis* L.; Greenl, Labr, Frank to Alaska; circumpolar.
 14. *R. occidentalis* Nutt.; Alaska to Oregon.
 15. *R. pedatifidus* Sm.; w. N. America and Asia. 15a, *R. p.* var. *leiocarpus* (Trautv.) Fern. (*R. affinis* R.Br.); Nfld, Que, Keew and Alta; also in Eurasia.
 16. *R. pensylvanica* L.f.; Labr, Nfld and NS to Alaska.
 17. *R. pygmaeus* Wahl.; Greenl and Que to Alaska.
 18. *R. repens* L., creeping buttercup, bassinet; naturalized from Europe in Labr, Nfld and NS to Ont.
 19. *R. sabinei* R.Br.; Greenl and Keew to Man and Alaska and e. Asia.
 20. *R. sceleratus* L., herbe de feu; Nfld and NS to Alaska; also in Eurasia.
 21. *R. sulphureus* Soland. in Phipps (*R. altaicus*); circumpolar.
 22. *R. uncinatus* D.Don var. *parviflorus* (Torr.) L. Benson (*R. bongardii* Greene); Alaska, Alta and BC to Calif.
- Other hosts: 23, *R. asiaticus* L. 24, *R. recurvatus* Poir. 25, *R. suksdorfii* Gray.
- Aecidium ranunculacearum* DC.: on *R. sp.* Alaska [175].
Ascochyta infuscans Ell. & Ev.: on leaves of 1 Man [93, p. 131].
Ceratobasidium anceps (Bres. & Syd.) Jackson: on ?2 Ont [495]

- Cladosporium herbarum* (Pers.) Lk.: on 2 Greenl [899].
Cylindrosporium sp.: on 10 Frank [971].
Didymaria didyma (Ung.) Sacc.: on 11 Alaska [175].
Doassansia nearctica Savile: on 10 Frank [939, p. 981].
D. ranunculina Davis: on leaves of 8 Man [93, p. 60; 292].
Entyloma ficariae (Cornu & Roze) Fisch. v. Waldh. (*E. ranunculi* (Bon.) Schroet.): on *R. sp.* Alaska [175, 983]; on 11 Man [93, p. 61; 292]; on 22 BC [957].
E. microsporum (Ung.) Schroet.: on 18 BC [292].
Erysiphe polygoni DC. ex Mérat: on *R. sp.* Alaska [175]; on 2 Que 31:123, NB 33:120, PEI 32:106; on 2, 18 NS [1138].
Heteropatella umbilicata (Pers. ex Fr.) Jaap (*Discosia acuta* Dearn., *Septoria cercosperma* Rostr.): on 2 Greenl [900]; on 13 Alaska [175, 250], Greenl [899]; on 13, 17 Greenl [902]; on 15a Frank [903].
Heterosporium groenlandicum Allesch.: on 15a Frank [903].
Leptosphaeria ranunculi Rostr.: on 15a Greenl [899, p. 558].
L. weberi Oud.: on 13, 17 Frank, 21 Que [52].
Leptotrochila ranunculi (Fr.) Schüepp [973, p. 251] (*Fabraea r.* (Fr.) Karst.): reported on 14 Alaska [175], 16 Man [93, p. 40], but these specimens should be reexamined to determine whether this fungus or *Pseudopeziza singularis* (q.v.) is present.
Metasphaeria annae Oud.: on 21 Alaska [175].
Mollisia atrata (Pers.) Karst.: on 2 Greenl [900].
Mycosphaerella ootheca (Sacc.) Dearn.: on 15a Mack [250].
M. ranunculi (Karst.) Lind: on 6 BC [50]; on 13, 17 Frank [52]; on 10 Greenl, 13 Alaska, 15a Keew, 17 Que [604]; on 13 Alaska [175]; on 13, 21 Frank [971]; on 17, 21 Greenl [603].
M. tassiana (de Not.) Johans. (*Sphaerella pachyasca* Rostr.): on 10, 15a Frank [903]; on 13, 15a Greenl [902]; on 15a Frank [604]; on 17 Greenl [900]; on 19, 21 Greenl [602]; on 21 Greenl [603, 899].
M. tassiana var. *tassiana*: on 2 Que [53]; on 13 Frank [52].
Nodulosphaeria aquilina (D.Sacc.) Holm: on 2 Que [53].
Peronospora ficariae Tul.: on *R. sp.* Alaska [175]; on 2 PEI 26:39, [1138].
Phoma complanata (Fr.) Desm.: on 17 Greenl [603].
P. herbarum West.: on 17 Greenl [602].
P. ranunculacearum Desm.: on 17 Greenl [900].
Pleospora coloradensis Ell. & Ev.: on 13 Frank [52].
P. comata Auersw. & Niessl (*Pyrenophora c.* (Niessl) Sacc.): on 13 Frank [52]; on 21 Alaska [175, 604], Frank [604].
P. herbarum (Fr.) Rabh.: on 13 Alaska [175], Greenl [900, 902]; on 15a Frank [903]; on 17 Greenl [603]; on 21 Frank [903], Greenl [602, 603].
P. penicillus (Schm.) Fekl. var. *p.* (*Pyrenophora chrysospora* (Niessl) Sacc.): on 21 Greenl [601, 602].
P. phaeocomoides (Berk. & Br.) Wint. (*P. vulgaris* Niessl): on 15a Mack [250].
P. phaeocomoides var. *infectoria* (Fekl.) Wehm. (*P. i.* Fekl.): on 21 Greenl [602].
Pseudopeziza singularis (Pk.) Davis: according to Schüepp [973], *P. singularis* is distinct from *Leptotrochila ranunculi* (q.v.). Examination by Dr. J. W. Groves of DAOM 2794 on 2 Que [197] and DAOM 86616 on 16 Ont revealed that the specimens are *P. singularis*.

Ranunculus

- Puccinia blyttiana* Lagerh. (*P. ranunculi* Blytt non Seym.): III on 15a Frank Que [605], Keew [828]; on 25 BC [15, p. 288].
- P. eatoniae* Arth. var. *ranunculi* Mains: 0 I on ?1 Man [93, p. 67], Ont [15, p. 147; 828].
- P. pulsatillae* Kalchbr. (*P. ustalis* Berk. var. *p.* (Kalchbr.) Linder): III on 15a Mack Frank [605, p. 266; cf. 15, p. 184].
- P. recondita* Rob. ex Desm. (*P. clematidis* Lagerh., *P. rubigo-vera* Wint.): 0 I on 2 Ont [828], NS [15, p. 180], NS PEI [1138], PEI 26:39; on 3 Alta [15]; on 5 Alaska BC Alta Sask NS [15, p. 178, 180], BC [1198], Alta Sask 24:59, Sask [93, p. 70], NS [1138]; on 9 BC [1198]; 14 Alaska, 15a Alta [15], [cf. 175].
- Ramularia aequivoca* Ces.: on *R. sp.* Alaska [175].
- Sclerotium rufum* Rostr.: on 2 Greenl [900].
- Selenophoma drabae* (Fckl.) Petr. (*Rhabdospora d.* (Fckl.) Berl. & Vogl.): on 21 Greenl [602].
- Stigmataea ranunculi* Fr.: on 13 Frank [605], Greenl [899, 901]; on 17 Greenl [899]; on 19, 21 Frank [903]; the fungus on these hosts is almost certainly *Mycosphaerella ranunculi* (q.v.), fide [971].
- Tranzschelia pruni-spinosae* (Pers.) Diet.: on 24 BC [15, p. 71].
- Urocystis anemones* (Pers.) Wint.: on 2 Greenl [900]; on 4, 6 BC [957]; on 13 Yukon [953].
- Uromyces dactylidis* Otth (*U. alopecuri* Seym.): 0 I on 2 Man 34:107; on 11 Sask Man, 20 Man [15, p. 183]; on 11, 20 Man [93, p. 72]; reported on 12 Alta [15], but host probably was 2; on 18 NS [15, p. 184; 1138].
- †Tomato spotted wilt virus: mosaic, mosaïque: on 23 Que 43:144.

Raphanus L.

CRUCIFERAE

Annual or perennial herbs native to the Old World.

1. *R. raphanistrum* L., wild radish, radis sauvage; naturalized from Europe; an abundant weed in Canada in Nfld, NS, NB and PEI and locally abundant in coastal BC, less important in Ont and Que and uncommon in the Prairie Provinces.
2. *R. sativus* L., radish, radis; native to Europe; widely cult. and in Canada occasionally persistent about gardens.

Albugo cruciferarum S.F.Gray (*A. candida* (Pers. ex Lév.) O.Kuntze, *Cystopus candidus* (Pers. ex Lév.) de Bary): white rust, albugine: on 1 NS 26:39, [1138]; on 2 Man 38:55, 58:76, [93, p. 29], in greenhouse, Que 57:83.

Alternaria brassicae (Berk.) Sacc.: black spot, tache noire: on 2 Que 35:38.

A. raphani Groves & Skolko [380, p. 227]: leaf and pod spot, pourriture noire: on 2 BC 46:56, [535], Ont 45:76, in greenhouse Ont 59:63; from seed BC Ont Que 44:71. This seed-borne pathogen was studied in some detail by Atkinson [23]. Soil cultures of the fungus maintained in the dry condition were still viable and pathogenic after 5 years [24].

Aphanomyces raphani Kendr.: black root, racine noire: on 2 BC 62:66, Ont 45:76, Que 38:55, 46:56, NS 56:85.

Erwinia carotovora (L.R.Jones) Holland: soft rot, pourriture molle: on 2 Ont 54:92, Que 58:76.

Erysiphe polygoni DC. ex Méral: powdery mildew, blanc: on 1 PEI 32:106, [1138].

Fungi from seed: of 2: *Acremoniella atra* (Cda.) Sacc., Holland; *Alternaria brassicae* (Berk.) Sacc., BC Man Que Holland; *A. brassicicola* (Schw.) Wiltshire, Que Holland; *A. consortialis* (Thüm.) Groves & Hughes, BC; *A. raphani* Groves & Skolko, BC Man Que; *A. tenuis* auct. sensu Wiltshire, BC Man Holland; *Bipolaris sorokiniana* (Sacc. in Sorok.) Shoem., Man; *Chaetomium dolichotrichum* Ames, Conn; *C. globosum* Kze., England; *Cladosporium cladosporioides* (Fres.) De Vries, Holland; *Cunninghamella echinulata* Thaxt., Ont Calif [374]. *Fusarium avenaceum* (Fr.) Sacc., Holland; *F. equiseti* (Cda.) Sacc., BC; *F. poae* (Pk.) Wr., Ont [334]. *Gonatobotrys simplex* Cda., Mich; *Nigrospora sphaerica* (Sacc.) Mason, Man; *Oospora lactis* Fres., BC; *Paecilomyces varioti* Bainier, Calif; *Papularia arundinis* (Cda.) Fr., BC; *Penicillium fuscoglaucum* Biourge, Que; *P. spinulosum* Thom, BC; *Pietriella asymmetrica* Curzi, BC Que; *Rhizoctonia solani* Kühn, *Rhizopus arrhizus* Fischer, BC; *Sordaria fimicola* (Rob.) Ces. & de Not., Man [374]. *S. hypocyprioides* Speg., BC [50]. *Stemphyllium botryosum* Wallr., Minn [374]. *Tripterospora brevicaudata* Cain, BC [158, p. 700, 374].

Peronospora parasitica (Pers. ex Fr.) Fr. (*P. brassicae* Gäum.): downy mildew, mildiou: on 1 NS 29:77, 42:72, [1138]; on 2 BC 45:76, [535], Ont 44:71.

Plasmidiophora brassicae Wor.: club root, hernie: on 2 Alaska [175], BC 49:69, Que NS 38:55, NS 35:38, PEI 29:59, [cf. 1138].

Rhizoctonia solani Kühn: damping-off or root rot, fonte des semis ou rhizoctone commun: on 2 BC 45:77, [535], Ont 35:38, in greenhouse Ont 40:52, Que 59:63.

Sclerotinia sclerotiorum (Lib.) de Bary: sclerotinia rot, pourriture sclérotique: on 2 Man 40:52.

Streptomyces scabies (Thaxt.) Waks. & Henrici: scab, gale commune: on 2 Sask 62:62, Ont 48:65, PEI 55:87.

Xanthomonas vesicatoria (Doidge) Dowson var. *raphani* (White) Starr & Burkh.: bacterial leaf spot, tache bactérienne: on 2 Que 58:76.

Aster yellows virus: aster yellows, jaunisse de l'aster: on 2 NB 42:62, 43:70, and later called sterility, stérilité virale, 44:71, 45:77.

Boron deficiency, carence de bore: brown heart, cœur brun: on 2 PEI 39:59 et seq.

Proliferation, prolifération: cause unknown, cause inconnue: on 2 BC 39:59, 41:52, 44:71.

Rhamnus L.

RHAMNACEAE

Shrubs or small trees mainly native to the temperate regions of the northern hemisphere.

1. *R. alnifolia* L'Hér., dwarf alder; in Canada from Nfld and NS to BC.
2. *R. cathartica* L., European buckthorn, épine noire; introduced into cult. from Europe and now naturalized in NS, NB, Que and Ont, and to a limited extent in Man; an undesirable plant because it is an alternate host for the crown rust of oats.

3. *R. davurica* Pall., green indigo, vert de Chine; native to n. central and n.e. Asia.
4. *R. frangula* L., alder buckthorn, bourdaine; introduced into cult. from Europe and escaped in NS, Que and Ont; the alternate host for a coronate rust on *Agrostis*.
5. *P. purshiana* DC., cascara, cascara; in Canada in BC; its bark is the source of the laxative Cascara Sagrada.

Other hosts: 6, *R. saxatilis* Jacq. 7, *R. tinctoria* Waldst. & Kit. 8, *R. utilis* Dcne.

- Cercospora rhamni* Fckl. on 1 Man [93, p. 115].
- Nectria cinnabarina* Tode ex Fr.: canker, chancre necrien: on 3 Ont 57:119.
- Pezicula morthieri* (Fckl.) Groves: on 1 Que [371, p. 331; 979].
- Phyllosticta rhamni* West.: leaf spot, tache foliaire: on 4 Man 44:101; on 5 BC 42:95, [535].
- Puccinia coronata* Cda.: crown rust, rouille des feuilles: 0 I on *R. spp.* Sask Man Ont Que PEI 24:54; on 1 Sask Man F51:144, [93, p. 67], Man Ont Que [15, p. 152], Man 33:120, 51:107, Que 32:106, 46:79, [197], NB 42:105, [1138], NS 53:110; on 2 Sask Ont 22:11, [15], Man 24:81, [93], Que NS PEI 25:9, 62, NB NS PEI [1138], NB PEI 40:97; on 3 Man 51:107; on 4 Ont 62:91, NB 40:97, [1138], NS 52:23; on 5 BC 40:97, 41:85, [15, 1198]; on 8 Man 51:107; on other *R. spp.* cult. Ont [828].
- P. coronata* f. sp. *agrostis* Erikss.: 0 I on 4 NB 39:106, 52:23, NS 52:106, [cf. 844].
- P. coronata* f. sp. *avenae* Erikss.: 0 I on 2 Man 33:65, NB NS PEI 37:73; 0 I on 2 from E. Canada yields predominantly this forma specialis, 52:23.
- P. coronata* f. sp. *festucae* Erikss.: occurs on 2 in small amounts in Man and E. Canada, 48:15, 49:18, 52:23.
- P. coronata* f. sp. *secalis* Peturson: 0 I on 8 Man 51:117; from aecia on 2, 6, 7, 8 in Man. This forma specialis is distinguished from f. sp. *avenae* by the individual infections bearing only a few aecia and the teliospores being crowned with several very long digitate processes [845].
- Schizophyllum commune* Fr.: on 5 BC [1198].
- Virus: mosaic, mosaïque: on 2 PEI 45:105, 46:79, 52:106.

Rheum L.

POLYGONACEAE

Stout perennial plants of Asia.

1. *R. officinale* Baill.; Asia; root used in medicine.
2. *R. rhaponticum* L., garden rhubarb, rhubarbe; Siberia; widely cult.

- Agrobacterium tumefaciens* (Sm. & Towns.) Conn: crown gall, tumeur du collet: on 2 BC 43:70, Sask 43:79, Ont 62:66, NS 31:51, [1138].
- Alternaria tenuis* auct. sensu Wiltshire: leaf spot, tache foliaire: on 2 Que 40:52.
- Ascochyta rhei* Ell. & Ev.: leaf spot, tache ascochytiq: on 2 Alta 45:77, Sask Man 36:38, [93, p. 132], Sask 30:49, Man 44:71, Que 24:43, NB PEI 26:27, NS 33:35, [1138]; a minor disease. As pointed out by Savile, 44:71, *A. rhei* and *Phyllosticta straminella*

auct. sensu Stevens (q.v.) are spore states of the same fungus.

Botrytis sp. or *B. cinerea* Pers.: gray mold, moisissure grise: on 1 Alaska [175]; on 2 BC 24:43, 36:38, 53:79, [535], Alta 30:49, Ont 38:55, NS 45:71, PEI 26:77; occasionally troublesome when rhubarb is being forced.

Colletotrichum erumpens auct. sensu Stevens: anthracnose, anthracnose: on 2 BC [535], Man 30:49, [93, p. 129], Que 24:43, NS 39:59, [1138]; from decayed petioles along with *Fusarium oxysporum* (q.v.), Man [335]; it is most unlikely the fungus is *C. erumpens* Sacc., 44:72.

Erwinia carotovora (L.R.Jones) Holland: soft rot, pourriture molle: on 2 Ont 55:87, Que 48:65.

Erysiphe polygoni DC. ex Mérat: on 2 Sask 1963 [Vanterpool in litt.].

Fusarium spp.: from 2: *F. acuminatum* Ell. & Ev. and *F. oxysporum* Schlecht. from decayed petioles Man [335].

Peronospora jaapiana Magn.: downy mildew, mildieu: on 2 Man, rare [93, p. 30].

Phoma herbarum West.: on 2 Man [93, p. 134], Que 40:52.

Phyllosticta rhei Ell. & Ev.: on 2 NS 41:52, [1138]; probably a phase of *Ascochyta rhei* (q.v.).

P. straminella auct. sensu Stevens: leaf spot, tache des feuilles: on 2 BC Que NB PEI 25:56, Man 24:43, [93, p. 136], Ont 40:52, Que PEI 29:37, NB 30:49, NS 33:35, [cf. 1138]; probably not distinct from *Ascochyta rhei* (q.v.).

Puccinia phragmitis (Schum.) Körn.: rust, rouille: 0 I on 2 Man 33:35, [93, p. 70], [cf. 15, p. 155; 830].

Ramularia rhei Allesch.: leaf spot, tache ramularienne: on 2 Alta 36:38, Sask 47:73, Man Que 44:72, PEI 43:70, [1138].

Rhizoctonia solani Kühn: crown rot, rhizoctone: on 2 Man 61:81.

Rhubarb virus I: rugose mottle: described on 2 Ont [654].

Rhubarb virus II: necrotic leaf spot, tache nécrotique: described on 2 Ont [654]; probably on 2 Sask 31:51, 32:51; and as streak, bigarrure, Sask 34:46, 37:40, Ont 35:39.

Virus: mosaic, mosaïque: on 2 BC 51:75, Que 25:56, NB 36:39, PEI 29:37.

Virus: red leaf, feuille rouge: first reported as crown rot, pourriture du collet, BC Sask Man 34:43, Alta Sask 30:49, Sask NB 29:36, Que 40:52, PEI 34:45; and then as red leaf, BC Man NB 53:79, Alta 46:69, Sask 50:83, 52:71, Ont 54:92. This disease is reported repeatedly in Alta and Sask, where it is often very destructive. Limited attempts to investigate the cause have been fruitless.

Other viruslike diseases: on 2: ring spot, tache annulaire, PEI 57:82; spindle stalk, filosité des pétioles, NS 52:71; vein clearing, PEI 61:82.

Rhinanthus L.

SCROPHULARIACEAE

Annual herbs of the cool parts of the northern hemisphere.

1. *R. borealis* (Stern.) Chab., rattle-box, claquette; Greenl, Nfld, NS, Que, across arctic Canada to Alaska and s. to Oregon.
2. *R. minor* Ehrh.; eastern arctic of Canada and Greenl.

Rhinanthus

- Botrytis cinerea* Pers.: on *R.* sp. Alaska [175]; on 2 Greenl [900].
Cronartium coleosporioides Arth.: II III on *R.* sp. BC F52:152, [1198]; on 1 Que [853].
Heteropatella umbilicata (Pers. ex Fr.) Jaap (*Septoria cercosperma* Rostr.): on 2 Greenl [900].
Leptotrochila lugubris (de Not.) Schüepp [973, p. 246] (*Ephelina rhinanthi* (Phill.) Sacc.): on 2 Greenl [900].
Metasphaeria affinis (Karst.) Sacc.: on 2 Greenl [900].
Mollisia atrata (Pers.) Karst.: on 2 Greenl [900].
Phialea cyathoidea (Bull.) Gill. (*Helotium cyathoideum* (Bull.) Karst.): on 2 Greenl [900].
Pleospora herbarum (Fr.) Rabh.: on 2 Greenl [900].

Rhododendron L.

ERICACEAE

Evergreen or deciduous shrubs of the colder temperate regions of the northern hemisphere, also in the high mts. of s. Asia, Malaysia, New Guinea and Australia.

1. *R. albiflorum* Hook., white rhododendron; BC and Alta to Ore and Colo.
2. *R. canadense* (L.) Torr. (*Rhodora c.* L.), bull's tongue; in Canada in Nfld, NS and Que.
3. *R. catawbiense* Michx.; Va to Ga and Ala; much cult.
4. *R. indicum* (L.) Sweet (*Azalea indica* L.); Japan.
5. *R. japonicum* (Gray) Suringar; Japan and spread from cult. in e. US.
6. *R. kamtschaticum* Pall.; BC, Alaska and n.e. Asia.
7. *R. lapponicum* (L.) Wahl.; in Canada in Nfld and Que.
8. *R. macrophyllum* D. Don (*R. californicum* Hook.), rhododendron; BC to Calif.
9. *R. obtusum* (Lindl.) Planch. f. *japonicum* (Maxim.) Wils. (*Azalea* 'Hindogiri').

Agrobacterium tumefaciens (Sm. & Towns.) Conn: crown gall, tumeur du collet: on \times *R.* sp. NS 62:91.

Antennatula arctica Rostr.: on 7 Greenl [603, 901].

Botrytis cinerea Pers.: gray mold, moisissure grise: on imported *R.* spp. NS 58:112.

Chrysomyxa ledi de Bary var. *rhododendri* (de Bary) Savile: rust, rouille: on 7 BC 52:118, F62:121, BC Man Nfld [955, p. 491]; on 8 BC [1198]; on several exotic \times *R.* spp. BC [1203].

C. piperiana (Arth.) Sacc. & Trott.: on 8 BC 52:118, F52:152, [535, 955, 1198]; on *R.* spp. cult. BC [1203; cf. 15, p. 35].

Coryneum rhododendri Schw.: leaf spot, tache foliaire: on *R.* spp. BC 33:72, [535].

Dimerosporium oreophilum Speg.: on 7 Greenl [899].

Diplodina eurhododendri Voss: leaf spot, tache diplodienne: on *R.* sp. BC 39:107, [535].

Exobasidium burtii Zeller: on 1 BC Alta [958].

E. canadense Savile: on 2 Que NB NS PEI [958, p. 651], NS PEI (as *E. vaccinii*) [1138].

E. affin. vaccinii Wor.: on 8 BC [958].

E. vaccinii Wor. sensu lat.: red leaf, feuille rouge: on *R.* spp. (*A.* spp.) BC 25:69, Ont 24:54; on 4 var. *micranthae* BC 38:97, [535]; on 5 BC 51:118, [535]; on 9 BC 40:89, [535]; repeatedly reported on plants from BC being forced in greenhouses in Ont.

Gloeosporium rhododendri Bri. & Cav.: leaf spot or blight, anthracnose: on 5 BC [535].

Helminthosporium rhododendri Rostr.: on 7 Greenl [603; 901, p. 73].

Lophodermium melaleucum (Fr.) de Not.: on leaves of 2 NS [1138].

Pestalotia macrotricha Kleb.: leaf spot and twig blight, pestalotiose: on *R.* spp. Ont 59:84, NS [462].

P. rhododendri (D. Sacc.) Guba: on *R.* sp. BC 32:94, [535, 1198], Que 36:81.

Pezicula grovesii Wehm.: on 2 NS [1138].

Phytophthora cinnamomi Rands: from *R.* sp. BC [1198].

Pucciniastrum vaccinii (Wint.) Jørstad (*P. myrtilli* (Schum.) Arth., *Thekopsora minima* (Arth.) Syd.): II III on 2 Que 32:106, NS [15, p. 18; 1138]; on *R.* spp. cult. NS 62:91.

Rhytisma rhododendri Fr.: on 6 Alaska [175].

Septoria azaleae Vogl.: angular leaf spot, tache angulaire: on *R.* sp. imported Ont 51:118; on *R.* sp. Que 26:33.

Synchytrium vaccinii Thomas: on 2 NS [1138].

Torula rhododendri Kze.: on 7 Greenl [601].

Vararia investians (Schw.) Karst.: on 2 NS [1138].

Rhus L.

ANACARDIACEAE

Shrubs or trees of temperate or subtropical regions of both hemispheres.

1. *R. aromatica* Ait.; in Canada in Que and Ont.
2. *R. glabra* L., white sumac, vinaigrier; in Canada from Que to BC.
3. *R. radicans* L. (*R. toxicodendron* auct. non L.), poison ivy, herbe à la puce; across Canada with the possible exception of Nfld.
4. *R. typhina* L., staghorn sumac, vinaigrier; in Canada from NS and Que to Ont.

Botryosphaeria obtusa (Schw.) Shoem. (*Physalospora o.* (Schw.) Cke.): on 4 NS [1138].

Cercospora rhoinea Cke. & Ell.: on 3 Man [93, p. 115].

Coryneum rhoineum (Dearn. & Barth.) Hughes: on branches of 2 BC [481, p. 341]; on 4 Ont F62:69.

Cryptodiaporthe aculeans (Schw.) Wehm.: on *R.* sp. Ont F59:66.

Cucurbitaria typhina Ell. & Ev.: on 2 BC; a *Strickeria*, fide Welsh [50].

Cylindrosporium irregulare (Pk.) Dearn.: on 3 Ont F62:69.

C. toxicodendri (Ell. & Mart.) Ell. & Ev.: on leaves of 3 Sask Man [93, p. 130].

Diaporthe spiculosa (Alb. & Schw.) Nits.: on *R.* sp. Ont F60:67.

Erysiphe sp.: on *R.* sp. BC [50]; a doubtful record.

Fusarium oxysporum Schlecht.: foot rot, pourridié fusarien: from decayed roots of 3 Man 42:107, [335].

- Phyllosticta rhoicola* Ell. & Ev.: on 3 Man [93, p. 136].
P. rhoina Kalchbr. & Cke.: leaf spot, tache foliaire: on *R. sp.* Man 42:105.
Pileolaria brevipes Berk. & Rav. (*P. toxicodendri* (Berk. & Rav.) Arth.): rust, rouille: II III on 1 Ont, 3 Man Ont Que [15, p. 70]; on 3 Man [93, p. 65], Ont 34:107, Que 32:107, NS [1138].
Sphaeropsis sumachi (Schw.) Cke. & Ell.: on 3 NS 36:70, [1138]; stat. conid. of *Botryosphaeria obtusa* (q.v.).
Sphaerotheca macularis (Wallr. ex Fr.) Lind (*S. humuli* (DC.) Burr.): on 2 BC [50], Man [93, p. 44].
Tubercularia vulgaris Tode: dieback, dépérissement: on *R. sp.* Que 62:91.
Valsa ceratophora Tul.: on 4 Ont F62:71.

Rhynchospora Vahl

CYPERACEAE

Chiefly perennial rushes of nearly cosmopolitan distribution.

1. *R. alba* (L.) Vahl; Nfld and NS to Alaska and Calif; also in Eurasia.

Cintractia montagnei (Tul.) Magn.: on 1 Ont [292].
C. taubertiana (Henn.) Clint.: on 1 Que NB [957].
Uromyces rhynchosporae Ell.: on 1 Ont [15, p. 196; 828].

Ribes L.

SAXIFRAGACEAE

Deciduous or evergreen, unarmed or prickly shrubs of the temperate regions of the northern hemisphere and in the Andes of S. America; some are grown for their edible fruits, others for ornament.

1. *R. acerifolium* Howell; BC to Ore.
2. *R. alpinum* L., alpine currant, groseillier des Alpes; Europe.
3. *R. americanum* Mill. (*R. floridum* L'Her.), black currant, gadellier noir; in Canada from NB and NS to Alta.
4. *R. aureum* Pursh, golden currant; Alta to Wash and Calif.
5. *R. bracteosum* Dougl., blue currant; Alaska to Calif.
6. *R. cynosbati* L. (*Grossularia c.* (L.) Mill.), prickly gooseberry, groseillier à maquereau; in Canada from NB and Que to Man.
7. *R. diacanthum* Pall.; n.e. Asia.
8. *R. divaricatum* Dougl. (*Grossularia divaricata* (Dougl.) Cov. & Britt.); BC to Calif.
9. \times *R. fuscescens* Jancz. (*R. bracteosum* \times *R. nigrum*).
10. *R. glandulosum* Grauer (*R. prostratum* L'Her.), skunk currant, castilles; Labr, Nfld and NS to Mack and BC.
11. \times *R. gordonianum* Lam. (*R. sanguineum* \times *R. odoratum*).

12. *R. grossularia* L. (*Grossularia reclinata* (L.) Mill.), common gooseberry, groseillier; Europe, n. Africa and Caucasus; origin of European gooseberry cultivars.
13. *R. hirtellum* Michx. (*Grossularia hirtella* (Michx.) Spach, *R. oxyacanthoides* auct. in part); Labr, Nfld and NS to Man and Alta, principal source of American gooseberry cultivars. 13a, *R. h.* var. *calcicola* Fern.; Labr, NS and Que to Ont.
14. *R. hudsonianum* Richards., black currant, gadellier sauvage; Que to Man, Sask and Alaska.
15. *R. lacustre* (Pers.) Poir (*R. echinatum* Lindl.), swamp currant, groseillier sauvage; Nfld and NS to Alaska and Calif.
16. *R. laxiflorum* Pursh; Alaska to Calif; also in e. Asia.
17. *R. lobii* Gray; BC to Calif.
18. *R. nigrum* L., black currant, cassis; Eurasia, widely cult. and occasionally escaping.
19. *R. odoratum* Wendl.f.; SD to Minn and Texas; escaped in other regions.
20. *R. orientale* Desf.; Eurasia.
21. *R. oxyacanthoides* L. (*Grossularia o.* (L.) Mill.), wild gooseberry, groseillier sauvage; Que to BC, n. to Keew and Yukon.
22. *R. petiolare* Dougl.; BC and Alta to Mont, Ore, Utah and Calif.
23. *R. rubrum* L., red currant, gadellier rouge; long cult. in n. Europe, but uncommon in N. America.
24. *R. sanguineum* Pursh, blood currant, sandragon; BC to Calif.
25. *R. sativum* Syme (*R. vulgare* Lam.), red currant, gadellier rouge; w. Europe; source of many cultivars; not distinct from 23.
26. *R. setosum* Lindl. (*Grossularia setosa* (Lindl.) Cov. & Britt.); Idaho, Alta, Sask, SD and Wyo.
27. *R. triste* Pall., including var. *albinervium* (Michx.) Fern., red currant, gadellier sauvage; Labr, Nfld, NS and Ont to Alta, Alaska and Ore; also in n. Asia.
28. *R. ussuriense* Jancz.; Manchuria and Korea.
29. *R. viscosissimum* Pursh, sticky currant; BC and Alta to Mont and Calif.

Other host: 30, *R. manshuricum* (Maxim.) Kom.

Alternaria ?*fasciculata* (Cke. & Ell.) Jones & Grout: on dead areas on leaves of 18 Sask [93, p. 112].
Asteroma ribicola Ell. & Ev.: on *R. sp.* Alaska [175].
Botryosphaeria obtusa (Schw.) Shoem.: on 18 Ont [996].

Botrytis cinerea Pers.: gray mold, moisissure grise: on 3, 4, 18, 23, 24, 25, 27 Alaska [175]; on twigs and stems of 12 BC 38:82, [535]; on 18 NS 51:97; on blossoms of 19 NS 48:112; on 25 BC 53:97; [535].

Ceratobasidium anceps (Bres. & Syd.) Jackson: on 10 Ont [495].

Cercospora angulata Wint.: angular leaf spot, tache angulaire: on *R. sp.* NS 24:26, [1138]; probably the fungus reported was *C. ribis* Earle; [cf. 190, p. 515].

C. septoriopsis Chupp: on 29 BC [341].

Ceriospora ribis Henn. & Ploettn.: on 5 Alaska [175].

Cladosporium sp.: on 14 Alaska [175].

Clathridium massarinum (Sacc.) Berl. (stat. conid. *Seimatosporium ribis-alpini* (Fautr.) Shoem. & Müller): on *R. sp.* Ont, 18 Man [997, p. 403]; as *Metasphaeria leiostega* on 3 Man [93, p. 55].

Glypeopycnis aeruginascens Petr.: on 5 Alaska [175].

Coryneum sp.: on 2, 27 Alaska [175].

Cronartium ribicola J.C.Fischer: white pine blister rust, rouille vésiculeuse du pin blanc: on *R. spp.* especially 18 BC Ont-PEI 24:26; *R. spp.* especially 20 Ont 43:114; on ?1 BC 33:120; on 3 Ont [472, 828], Que 31:106; on 4 Ont [472], Que 31:92; on 5 BC [15, p. 27; 1198]; on 6 Man 44:93, Ont [472], Que 31:106; on 7 Man 43:114; on 8 BC [15, 1198]; on 10 Man 44:92, Ont [472, 828], Que 31:106, [197], NS PEI [1138]; on 12 BC 31:70, [535], Ont Que 27:43, Que 31:106, Que NB NS 29:50, NB NS 25:31, NS [1138], PEI 35:53, Nfld 57:106; on 13 Que 31:106; on 15 BC 33:120, [15, 1198], Ont 31:123, Que 31:106; on 16, 17 BC [1198]; on 18 BC 21:25, [15, 535, 1198]; Man 44:92, Ont [15], Ont PEI 33:120, Que 31:106, NB NS [1138], Nfld 54:114; on 19 Ont [828]; on 21 BC [1198], Man 44:93, Ont [828], Que 31:106, NB NS PEI [1138]; on 24 BC 34:108, [535, 1198]; on 25 BC [535], Ont [828], Que 31:106, NS [1138]; on 27 Ont [472, 828], Que 31:105; on 29 BC [1198].

It was noted early that the rust was destructive to 18 as it caused early and almost complete defoliation in some years [472]. At Ste Famille, Que, the rust caused such severe defoliation that current-season buds developed prematurely, 39:85, 40:76. For the early records of the rust in Canada, see *Pinus*, [cf. 472]. McCubbin [678] was one of the first to suggest that the infection of *Pinus strobus* was through the needles.

When the progressive development of rust on *Ribes* was followed at Ottawa, Ont, infection was observed on 18, then on 25 and still later on 12. Certain cultivars, including Viking [400, 401], remained unaffected, 35:52, and the same was true for 30, 36:55, 37:57. When three to five applications of bordeaux, instead of a single spray, were applied the yield of black currants was markedly increased, 39:85.

A breeding program for rust resistance begun in 1935 resulted in some promising seedlings in a cross of 18 Kerry and 28, 43:88, [486]. From this program were developed O-381 Crusader, O-393 Coronet, 48:85, and O-396 Consort. The latter is a self-fertile cultivar, 50:105. However, all these rust-resistant cultivars are more or less susceptible to *Sphaerotheca mors-uvae* (q.v.) [485].

Diaporthe eres Nits.: on *R. sp.* Alaska [175].

D. strumella (Fr.) Fckl. var. *longispora* Wehm.: on *R. sp.* Ont [1136, p. 46].

D. strumella f. oligocarpa: on 16 Alaska [175].

Dothidea ribesia (Pers.) Fr.: on 3, 25 Man [93, p. 47].

Drepanopeziza ribis (Kleb.) Höhn. (*Pseudopeziza r. Kleb.*; stat. conid. *Gloeosporidiella r.* (Lib.) Petr., *Gloeosporium r.* (Lib.) Mont.): anthracnose, an-

thrachnose: although *D. ribis* was recorded, it and *Mycosphaerella ribis* (q.v.) were reported together in the early reports, 24:26. Specific reports are: on 5, 9, 16, 18, 25, 27 Alaska [175]; on 4 Man [93, p. 136]; on 6 Man 44:93; on 12 BC Sask 32:70, BC [535], Man 42:82 Ont 44:93, NB 29:50, NS 43:89, PEI 30:68; on 12, 18 25 Sask [93, p. 41, 130]; on 13 cult. Que 31:70; on 18 Ont 47:94, Que 57:106, NS 49:87, Nfld 61:96; on 25 BC 43:29, [535], Alta 32:70, Sask 27:43, Man-PEI 25:30, NS [1138]. At times defoliation may be severe.

Rimpau [887] and Klebahn [556] both demonstrated physiologic specialization; the following forms probably occur in Canada, *D. ribis f. sp. ribis* [as *f. sp. rubri* Kleb.] on 23, *D. r. f. sp. nigri* Kleb. on 18, and *D. r. f. sp. grossulariae* (Blodg. ex Rimpau) Müller et al. on 12, with the conidial states, *G. ribis f. sp. ribis*, *G. r. f. sp. nigri* Kleb. and *G. r. f. sp. grossulariae* Kleb.

D. variabilis Müller et al. (stat. conid. *Gloeosporidiella v.* (Laub.) Nannf.): anthracnose, anthracnose: on 2 Ont Que NS 61:106, Ont Que 57:120, Que 32:92.

Fomes ribis (Schum.) Cke.: on 25 Man [93, p. 81], NS [1138].

Fusarium illosporoides Sacc.: on *R. sp.* Alaska [175].

Gibberidea ribis Tracy & Earle: on 12 Alaska [175].

Glomerella cingulata (Stonem.) Spauld. & Schrenk: anthracnose, anthracnose: on fruit of 12 Ont 55:111.

Godronia cassandrae Pk. f. *ribicola* Groves: on 10 Ont type; on 10 Ont (Canad. J. Bot. 43: 1214. 1965).

G. davidsonii Cash: on 9 Alaska [175, 979]; on *R. sp.* Nfld. [979] as *G. urceolus*.

G. ribis (Fr.) Seav. (*Scleroderris r.* (Fr.) Gill.): on *R. sp.* Ont [979]; a doubtful record as no specimen of this fungus from N. America has been seen by Groves (Canad. J. Bot. 43: 1238. 1965).

G. uberiformis Groves (stat. conid. *Topospora uberiformis* (Fr.) Fr.): on *R. sp.* Ont. type; on *R. sp.*, 3 Ont (Canad. J. Bot. 43: 1245. 1965); ? on *R. sp.*, 5 Alaska [175]; ? on *R. sp.* Man [93, p. 40]; the questioned reports were recorded as *G. urceolus*.

Lachnum bicolor (Bull.) Karst.: on twigs of *R. sp.* Man [93, p. 40].

Leptosphaeria coniothyrium (Fckl.) Sacc.: on 18 Alaska [175].

Marssonina bracteosum Dearn. & Barth.: on 5 Alaska [175].

Melampsora ribesii-purpureae Kleb. (*M. epitea* Thüm.): 0 1 on *R. sp.* Alta F63:104; on 8, 15 BC, 27 Yukon [15, p. 55]; on 27 Alaska [175].

Mycosphaerella ribis (Fckl.) Felg. (*M. grossulariae* auct. [3]; stat. conid. *Septoria r.* Desm.): leaf spot, tache septorienne: on *R. sp.*, 5, 12, 16, 18, 25 Alaska [175]; on 2, 7, 21 Man 40:97; on 2 Que 61:106; on 3, 12, 18, 25 Sask Man [93, p. 139]; on 10, 14 Man 44:93; on 12 Sask 27:44, Alta NS 30:68, Man 38:82, Ont 32:71, Que 34:63, NB 36:56, [cf. 1138]; on ?13 Man 43:114; on 18 Sask 33:121, 35:53, Man 34:63, Ont 36:56, 51:97, Que 46:72; on 21 cult. Man 44:93; on 25 BC [535], Sask 36:56, Man 44:93; a common leaf pathogen.

Nectria cinnabarina Tode ex Fr. (stat. conid. *Tubercularia vulgaris*): dieback, dépérissement nectrien: on *R. spp.* Man [93, p. 46]; on *R. sp.*, 5, 14, 18, 24, 25 Alaska [175]; on 12 Que 52:93, NS 38:82, [1138]; on 18 Alta 35:53, NS 30:67; on 25 Ont 50:106.

Phragmodothella ribesia (Fr.) Petr.: on 14, 25 Alaska [175].

Phyllosticta grossulariae Sacc.: leaf spot, tache foliaire: on 6, 12 Man 44:93; on 12 Que 59:77; on 25 BC 43:89, [535].

Phyllosticta ribesicida Speg.: on *R. sp.* Alaska [175].

Plasmopara ribicola Schroet.: downy mildew, mildiou: on 12 Ont 45:96; on 21 Man Ont [93, p. 31]; on 27 Ont 49:87.

Pseudovalsa ribesia Sacc. & Scalia: on 16 Alaska [175].

Puccinia caricina DC. (*P. carcis* (Schum.) Schroet., *P. c.* var. *grossulariata* Arth., *P. pringsheimiana* Kleb.): rust, rouille: on 2 Alaska [15, p. 208; 175]; on 3 Sask Man [93, p. 66], Ont [15]; on 5 Alaska [15, 175], BC [15]; on 6 Ont Que [15]; on 8 BC [1198]; on 10 Alaska [175], BC Alta NS Labr [15], Ont [828]; Que 32:107, NS [1138]; on 11 Alaska [15, 175]; on 12 BC 31:70, [535], Alta 44:93, Sask Man [93], Man Que 22:37, Ont 54:114, NB NS 23:55; on 13 NS [15, 1138]; on 13a Ont [828]; on 14 Alaska [15, 175], Alta [15], Ont [828]; on 15 Alaska [15, 175, 1038], BC [1198], Alta Ont [15], NS [1138]; on 16 Alaska [175, 1038], BC [15]; on 18 Sask [93], Man 29:72, 34:62, Ont 42:82, [828]; on 21 Alaska [15, 175], Sask 31:123, Sask Man [93], Ont [828], NS [1138]; on 22, 24 Alaska [15, 175]; on 25 Alaska [15, 175], Alta 54:114, Sask 44:93, Man 43:89, Que NB Nfld 61:96, NS 59:77; on 26 Alta [15], Sask [93]; on 27 Alaska [15, 175]. Losses may occasionally be heavy NS 57:106.

P. parkerae Diet. & Holw.: III on 5 BC [1056]; on 8 BC [15, p. 211; 1056; 1198]; on 15 Alaska [15, 175], BC [15, 1056, 1199], Alta [93, p. 70].

P. ribis DC.: III on 23 Alaska [175]; on 27 Sask 33:121, [15, p. 295], Sask Man [93, p. 70], Ont [828].

Rhyncophoma raduloides Sacc. & Scalia: on 5, 16 Alaska [175].

Sebacina calcea (Pers.) Bres.: on fallen branches of *R. spp.* Man [93, p. 74].

Septoria aurea Ell. & Ev. (stat. perf. *Mycosphaerella a.* Stone): leaf spot, tache septorienne: on 4 Sask Man [93, p. 137], Ont 43:114.

S. sanguinea Dearn.: leaf spot, tache septorienne: on 24 BC 45:119, [535].

Sphaerographium niveum Dearn. & House: on fallen twigs of *R. sp.* Man [93, p. 140]; a misdetermination as the true fungus occurs only on *Rhamnus*.

Sphaeropsis ribicola Cke. & Ell.: on twigs of 4, 25 Man [93, p. 140]; stat. conid. of *Botryosphaeria obtusa* (Schw.) Shoem. [1053, p. 544].

Sphaerotheca macularis (Wallr. ex Fr.) Magn.: on 4, 5, 9, 25 Alaska [175].

S. mors-uvae (Schw.) Berk. & Curt.: powdery mildew, blanc: on 2 Alta 55:125; on 3, 8 Sask Man, 14 Sask [93, p. 45]; on 6 Ont 24:60; on 10 Mack 61:96; on 12, 15, 25 Alaska [175]; on 12 BC Sask Ont-PEI 24:26, BC [535], Alta 30:68, Ont 33:120, Nfld 52:93; especially destructive on European cultivars of 12 BC 32:71, Ont 36:56, Que 38:81, NS 55:111; good control obtained with lime sulphur NS 43:89, or Karathane NS 56:109; on 14 Alta 54:108; on 18 BC 34:63, [535], Alta 31:69, 62:80, Sask 34:108, Man 44:93, Ont 31:69, Que 46:72; on 18, 25 NS 58:86, [1138]; on 25 BC 34:63, [535], Alta Sask 31:69, Nfld 51:97; heavy on the new rust-resistant cultivars from 18 × 28 NS 57:106, and elsewhere [485].

Thyridium antiquum (Ell. & Ev.) Sacc.: on twigs of 3 Man [93, p. 57].

Thyronectria berolinensis (Sacc.) Seav.: dieback, dépérissement: on *R. spp.* Man Ont and on dead pruned canes of 25 Ont 51:97; on 4, 12, 25 cult. Man [93, p. 46].

Topospora uberiformis (Fr.) Fr. (*Mastomyces friestii* Mont.): on dead branches of 3 Man [93, p. 134].

Tubercularia vulgaris Tode: on branches of *R. sp.* Man [93, p. 128].

Venturia grossulariae (Auersw. & Fleisch.) Sacc.: on *R. sp.* Que [53].

Current reversion virus: reversion, régression: on 18 BC 42:82; the only report of this disease in Canada.

Virus: mosaic, mosaïque: on 18 Alta 25:31; only report.

Potassium deficiency, carence de potasse: leaf scorch, pyrolose: on 12 NS 48:86.

Robinia L.

LEGUMINOSAE

Deciduous trees or shrubs of N. America.

1. *R. pseudo-acacia* L., black locust, robinier; s.e. and s. central US; often planted for ornament and naturalized in Canada in NS, Que and Ont.

Ascochyta sp.: on pods of 1 Que 56:120.

Camarosporium robiniae (West.) Sacc.: on 1 Ont F63:69.

Fomes robiniae (Murr.) Sacc. & D.Sacc. (*F. rimosus* auct. non (Berk.) Cke.): causes a spongy yellow heartrot of living 1; on 1 Ont DAOM F4576. For characters in culture based on US isolates, see [791].

Gloeosporium sp.: anthracnose, anthracnose: on 1 Que 58:108.

Tubercularia vulgaris Tode: coral spot, chancre necrien: on twigs of 1 Que 56:120.

Romneya Harv.

PAPAVERACEAE

A herbaceous perennial.

1. *R. coulteri* Harv., canyon poppy; known only from Calif.

Sclerotinia sclerotiorum (Lib.) de Bary: wilt, flétrissure sclérotique: on 1 BC 37:73.

Rorippa Scop.

CRUCIFERAE

Aquatic or terrestrial plants of the temperate regions.

1. *R. islandica* (Oeder) Borbás (*R. palustris* (L.) Bess., *Radicula p.* (L.) Moench), water cress, cresson de marais; Greenl, Labr and Nfld to Man, Mack, Yukon and Alaska; also in Eurasia.

Albugo cruciferarum S.F.Gray (*A. candida* (Pers. ex Lév.) O.Kuntze): on 1 Sask [93, p. 29].

Pyrenopeziza ?campanulae Fckl.: on 1 Alaska [1038].

Rosa L.

ROSACEAE

Mostly deciduous shrubs of temperate and subtropical regions of the northern hemisphere.

1. *R. acicularis* Lindl.; e. US and e. Asia. 1a, *R. a.* var. *bourgeauiana* Crépin (*R. b.* Crépin); Que to Yukon and BC.
2. *R. blanda* Ait.; in Canada from NB and Que to Man.

Rosa

3. *R. californica* Cham. & Schlecht.; Ore and Calif.
 4. *R. canina* L.; Europe; escaped from cult. in NS.
 5. *R. carolina* L.; in Canada in s. Ont.
 6. × *R. centifolia* L. var. *muscosa* (Mill.) Sacc.; Caucasus; sometimes spreads from cult.
 7. *R. eglanteria* L.; introduced from Europe and naturalized in e. Canada.
 8. *R. gymnocarpa* Nutt.; BC to Calif and Mont.
 9. *R. helenae* Rehd. & Wils.; China.
 10. *R. hemisphaerica* Herrm.; w. Asia.
 11. *R. macounii* Greene; BC to Sask in Canada.
 12. × *R. noirettiana* Thory (*R. chinensis* Jacq. × *R. moschata* Herrm.).
 13. *R. nutkana* Presl; Alaska and BC to Wyo and Calif.
 14. *R. pisocarpa* Gray; BC to Idaho and Calif.
 15. *R. rugosa* Thunb.; e. Asia and naturalized in Que and Ont.
 16. *R. spinosissima* L.; introduced from Europe and spread from cult. 16a, *R. s.* var. *altaica* (Willd.) Rehd.
 17. *R. suffulta* Greene; in Canada in Man and Alta.
 18. *R. virginiana* Mill. (*R. ?lucida* Ehr.); Nfld and NS to Ont.
 19. *R. woodsii* Lindl.; Ont to BC.
 20. *R. xanthina* Lindl.; e. Asia.
- Other host: 21, *R. setigera* Michx. var. *tomentosa* Torr. & Gray.
- Agrobacterium rubi* (Hildebrand) Starr & Weiss: cane gall, tumeur de la tige: on *R. spp.* cult. BC 52:18, [535].
- A. tumefaciens* (Sm. & Towns.) Conn (*Bacterium t.* Sm. & Towns.): crown gall, tumeur du collet: on *R. spp.* cult. Ont 23:121, BC [535], Alta (on imported plants) 59:84, Sask 28:98, Que 44:115, NS PEI [1138], NS 42:105, PEI 35:72; on 15 Que 36:82. Most frequently reported on climbing roses PEI 42:105, but other cultivars are sometimes weakened by the disease Ont 55:12.
- Botrytis cinerea* Pers.: gray mold, moisissure grise: on *R. spp.* Alaska [175]; on blossoms of *R. spp.* cult. BC 48:112, Alta 58:108, Sask 52:118, Man 54:136, Ont 29:11, Que 38:108, NB 37:83, NS 61:107, PEI 55:126; caused damage to nursery stock in storage PEI 52:118; as a cane blight BC 50:131.
- Clathridium corticola* (Fckl.) Shoem. & Müller (stat. conid. *Scimatoporus lichenicola* (Cda.) Shoem. & Müller): on *R. sp.* as *Metasphaeria leiostega* Man [93, p. 55; 997, p. 405].
- Coniothyrium wernsdorffiae* Laub.: canker, chancre: on *R. spp.* cult. Ont 24:75, 37:83.
- Coryneum foliicola* Fckl.: on *R. sp.* Alaska [175].
- Cryptosporium minimum* Laub.: brown canker, chancre brun: on *R. sp.* BC 54:136, [535].
- Cytospora ambiens* Sacc.: dieback, dépérissement: on *R. spp.* Man 45:119, Ont 46:88, Que 57:170.
- C. pulcherrima* Dearn. & Hansbr.: on 13 BC [253].
- Diaporthe exiguestroma* Dearn.: on dead stems of *R. sp.* BC; a *Didymella*, fide Wehmeyer [50].
- Didymella rauii* (Ell. & Ev.) Sacc.: on stems of *R. sp.* BC; a *Gnomonia* or *Gnomonina*, fide Wehmeyer [50].
- Didymosphaeria borgii* Carnana-Gatto & Sacc.: on stems of *R. sp.* BC [50].
- Diplocarpon rosae* Wolf (*Fabraea r.* (Wolf) Seav.; stat. conid. *Marssonina rosae* (Lib.) Lind, *Actinonema r.* (Lib.) Fr.): black spot, tache noire: on *R. spp.* cult. BC 32:94, [535], Alta 42:105, Sask 30:91, Man PEI 26:36, Ont NB 24:56, Que 27:98, NS 25:74, [1138], Nfld 62:91; on *R. sp.*, 15 Alaska [175]; on escaped 7 Que 54:136. The disease is present wherever the rose is cult. [979]. It disfigures the leaves, reduces the vigor of the plants, and may cause severe defoliation; cultivars differ greatly in their susceptibility. For a brief summary of the early history of black spot, see 48:113.
- Discosia artocreas* Tode ex Fr.: on overwintered leaves of *R. sp.* Sask 36:82.
- Gloeosporium ?rosae* Halst.: anthracnose, anthracnose: on hips of *R. sp.* cult. Que 59:84.
- Hendersonia rosae* Kickx: on *R. sp.* Ont 33:121.
- Leptosphaeria coniothyrium* (Fckl.) Sacc. (stat. conid. *Coniothyrium fuckelii* Sacc.): stem canker, chancre: on *R. spp.* cult. BC 30:92, [535], Alta 45:120, Ont 31:100, 26:36, NS [1138]; on 12 Ont 51:118. Cankers often arise through pruning wounds Ont 45:120.
- Metasphaeria macounii* Dearn.: on dead stems of *R. sp.* BC [50].
- Mycosphaerella rosicola* B.H.Davis (stat. conid. *Cercospora r.* Pass.): leaf spot, tache foliaire: on *R. spp.* cult. or wild Sask 30:91, 46:88, Sask Man [93, p. 115], Man 23:121, Ont NB NS 25:74, Que 50:131, NB 61:107, NB NS [1138], PEI 53:122; on 6 BC 42:106, [50, 535]; on 15 Man 42:105; on 20 Ont 44:116, and a microconidial state, probably *Phyllosticta rosicola* (q.v.), also present, 45:120.
- Nectria cinnabarina* Tode ex Fr.: on 13, 15 Alaska [175].
- Peronospora sparsa* Berk.: downy mildew, mildiou: on *R. spp.* BC 37:83, [535].
- Pestalotia compacta* Sacc.: on *R. sp.* Alaska [175].
- Phomatospora rosae* Rehm: on *R. sp.*, ?2 Man [93, p. 55].
- Phragmidium spp.*: rust, rouille: on *R. spp.* cult. and wild BC Man-NB PEI 24:56, Alta Sask 28:98, NB 26:36.
- P. americanum* (Pk.) Diet.: 0 I II III on *R. spp.* Alaska [175], Ont 47:14, [15, p. 87], Mack 40:100, Ont Que 43:115, Que 31:99, 36:81, NS 32:94, [1138]; on 1, 2, 5, 21 Ont [828]; on 2 Ont [15], Que 32:107, [8], NS [1138]; on 5 NS [1138]; on 18 Ont NS [15], NS [1138].
- P. fusiforme* Schroet. (*P. rosae-acicularis* Liro): 0 I II III on *R. spp.* Alta Sask [93, p. 64]; on 1 BC Alta Man Ont [15, p. 86], Sask F51:144, Man [93]; on 1, 13, 15 Alaska [175]; on 1a BC Alta [15]; on ?11 Sask [93]; on 13 Alta, 17 Ont [15].
- P. montivagum* Arth.: 0 I II III on *R. sp.* Alta 54:136; on *R. sp.* Sask, 2 Man [93, p. 64]; on *R. sp.*, 19 Alaska [175]; on 1a Alta [15, p. 86]; on 2 Man 44:116; on 8 BC 34:108.
- P. mucronatum* (Pers.) Schlecht. (*P. disciflorum* J.F. James): 0 I II III on *R. sp.* NB [15, p. 84], BC Que 31:99, BC 44:116, Alta PEI 53:122, Man [93], Ont 31:123, 43:115, NB NS [1138]; on 2 Ont [828].

Phragmidium rosae-arkansanae Diet.: 0 I II III on *R. spp.* Alta Sask [93, p. 65]; on 17 Alta [15, p. 84].

P. rosae-californicae Diet.: 0 I II III on *R. sp. 1*, 3 Alaska [175]; on 3, 8, 13, 14 BC [15, p. 87]; on 8 BC [535]; on 14 BC 31:123.

P. rosae-pimpinellifoliae Diet. (*P. subcorticinum* Wint.): 0 I II III on *R. sp.*, 10, 15 Alaska [175]; on *R. sp.* BC [535], Ont 49:110, Que PEI 36:81, NS 43:115; on 2 Ont [828]; on 10 Alaska [15, p. 85]; on 16 NB 48:113, [cf. 1138].

P. rosicola (Ell. & Ev.) Arth.: III on *R. sp.* Sask [93, p. 65]; on 17 Alta [15, p. 89].

P. speciosum (Fr.) Cke.: III on *R. spp.* cult. and wild, Sask 30:91, Sask NS 33:121, Man 29:78, 34:90, Ont 40:97, Que NS 39:107; on *R. sp.* Man, 2, 18 NS [15, p. 88]; on *R. sp.* Sask Man, 11 Man [93, p. 65]; on *R. spp.* NB NS, 2, 5, 18 NS [1138]; on 1, 2 Ont [828]; on 2 Ont 33:121; a destructive rust if permitted to spread NS 49:110; the rust of 2 proved to be heterothallic, and telia follow in the same infections after the aecia [25].

P. tuberculatum J. Muell.: on *R. sp.* Alaska [175].

Phyllosticta rosicola Massal.: leaf spot, tache des feuilles: on 2 Man 44:116; on 20 Ont 45:120.

Pilobolus crystallinus Tode: sporangia on the leaves of *R. sp.* in greenhouse, NB 44:116.

Pleosphaerulina intermixta (Berk. & Br.) Berl.: on stems of *R. sp.* BC [50].

Polyporus tulipiferae (Schw.) Overh.: from *R. sp.* Ont [791].

Sclerotinia sp.: on *R. sp.* Que 29:71.

Sclerotium sp.: on 15 Alaska [175].

Seimatosporium caudatum (Preuss) Shoem. (*Coryneum microstictum* auct.): canker, chancre: on *R. spp.* cult. BC 33:121, [995, p. 414], Ont 37:83.

S. discosioides (Ell. & Ev.) Shoem. (*Coryneum microstictum* Berk. & Br. var. *foliae* Dearn. & Overh.): leaf spot, tache des feuilles: on *R. sp.* Ont Que, 2 Ont [995, p. 415]; on *R. sp.* Que 53:122.

S. rosae Cda.: on *R. sp.* Ont [995].

Sphaceloma rosarum (Pass.) Jenkins: anthracnose, anthracnose: on *R. spp.* BC Que NB 42:105, BC [535], Ont 46:88, PEI 56:131; on *R. spp.* NS, 18 NB [1138]; on 16a Man 42:105.

Sphaerotheca macularis (Wallr. ex Fr.) Lind (*S. humuli* (DC.) Burr.): powdery mildew, blanc: on *R. sp.* BC 45:120, [535], Alta 42:106, Sask Man [93, p. 44], Sask 49:110, Man 43:115, PEI 39:107, [1138]; on 4 BC 48:113.

S. pannosa (Wallr. ex Fr.) Lév.: powdery mildew, blanc: on *R. spp.* BC Ont Que 24:56, Alta 28:98, Sask Man 38:108, Ont 46:88, NB 32:94, NS 29:71, PEI 26:36, NB PEI [1138]; on *R. sp.*, 1 Alaska [175]; on 2 Que 32:107; on 15 Que 36:82. A common pest of climbing roses and it is commonly severe on florists' roses in greenhouses. For comment on the causal organisms, see [3, p. 406].

Valsa ambiens (Pers. ex. Fr.) Fr.: canker, chancre cytosporéen: on *R. sp.* Sask 36:82.

Valsella sp.: on 9 Sask 39:108.

Verticillium spp.: wilt, flétrissure verticillienne: on *R. sp.* 30:92; *V. albo-atrum* Reinke & Berth., from *R. sp.* in severely affected nursery Ont [690]; *V. dahliae* Kleb., from *R. sp.*, Que 58:109.

Xiphinema diversicaudatum (Micoletzky) Thorne: dagger nematode, nématose des racines: on *R. spp.* in greenhouses, Ont 62:92.

Virus: infectious chlorosis, chlorose virale: on *R. sp.* BC NB 30:92, BC [535], Ont 29:71.

Virus: mosaic, mosaïque: on *R. spp.* Sask 39:108, Man Ont 41:98, NB 34:91, 36:82, NS 37:114.

Iron deficiency, carence de fer: chlorosis, chlorose: on *R. spp.* Man 61:107.

Rubus L.

ROSACEAE

Deciduous or evergreen shrubs, suffrutescent or herbaceous plants, of worldwide distribution, particularly abundant in the northern hemisphere.

1. *R. acaulis* Michx. (*R. arcticus* ssp. *stellatus* var. *a.* (Michx.) Boivin), dewberry, mures rouges; Labr, Nfld and Que to Alaska.
2. *R. alaskensis* Bailey; Alaska.
3. *R. allegheniensis* Porter (including *R. nigrobaccus* Bailey); in Canada in NS, NB and Que; for convenience, records on cult. blackberry, mures, are referred to under this species.
4. *R. arcticus* L.; Labr, Nfld and Que to Man, Alta and Alaska.
5. *R. caesius* L.; Eurasia; locally escaped from cult.
6. *R. canadensis* L. (*R. randii* (Bailey) Rydb.); Nfld and NS to Ont.
7. *R. chamaemorus* L., bake-apple, chicoute; Greenl, Labr, Nfld and NS to Man, Alta, BC and Alaska; also in Eurasia.
8. *R. flagellaris* Willd. (*R. procumbens* Muhl.); in Canada in Que and Ont.
9. *R. frondosus* Bigel; Mass to Ind and ?Ont.
10. *R. glandicaulis* Blanch.; in Canada in NS, NB and Que.
11. *R. henryi* Hemsl.; central and e. Asia.
12. *R. hispidus* L.; in Canada from PEI and NS to n. Ont.
13. *R. idaeus* L.; Europe and naturalized from Nfld to Ont. 13a, *R. i.* var. *aculeatissimus* Regel & Tiling (*R. melanolasius* Focke); in Canada from Man to BC. 13b, *R. i.* var. *strigosus* (Michx.) Maxim. (*R. s.* Michx.), Labr, Nfld and NS to BC and Alaska; records on red raspberry, framboisier, are referred to under this variety.
14. *R. laciniatus* Willd.; cult. and naturalized from the Old World.
15. *R. leucodermis* Torr. & Gray; BC to Mont and Calif; source of some cultivars grown for their fruit.
16. × *R. loganobaccus* Bailey, loganberry, ronce de Logan; cult. for its fruit.
17. *R. macropetalus* Hook.; BC to Calif; cult. for its fruit.

Rubus

18. \times *R. neglectus* Pk.; apparently a natural hybrid of 13a and 13b.
 19. *R. occidentalis* L., black raspberry, framboisier noir; in Canada from NB and Que to Ont; cult. for its fruit.
 20. *R. odoratus* L., purple-flowering raspberry, colottes; in Canada in NS, Que and Ont.
 21. *R. parviflorus* Nutt.; Ont to Alaska, BC, Alta and Calif.
 22. *R. pedatus* Smith; Alaska, Yukon and Alta to Mont and Calif; also in e. Asia.
 23. *R. procerus* P.J.Muell., Himalaya berry; Europe; spread from cult. in e. US.
 24. *R. pubescens* Raf. (*R. triflorus* Richards.), dewberry, catharinettes; in Canada from Labr, Nfld and NS to BC.
 25. *R. spectabilis* Pursh; Alaska to Idaho and Calif.
 26. *R. stellatus* Smith (*R. arcticus* ssp. s. (Smith) Boivin var. s.); BC, Alaska and e. Asia.
- Other host: 27, *R. glandulicola* [*R. ?glandulicaulis* Blanch.].
- Agrobacterium rubi* (Hildebrand) Starr & Weiss: cane gall, tumeur de la tige: on 13 cult. BC 61:98, [535]; on 15 BC 62:81; on 16 BC 49:88, 50:107, 53:97, 98, [535]; ? on 19 Ont 51:98; on 23 BC 49:88, 53:97, [535]. The earliest reports of crown gall in BC, 21:36, 22:45, suggest the presence of *A. rubi* rather than *A. tumefaciens*. Isolates from 23 in BC induced tumors in this host and in *Vicia faba* and other plants [194].
- A study was made of the anatomical structure of the galls induced by *A. rubi* and *A. tumefaciens* (q.v.) on 16 and 23 as they occur naturally on the canes. Galls from any region of the stem of the floral canes systemically affected by *A. rubi* originate from or near the cambial layer and not from the lower layer of the pericycle. The vascular system in galls caused by both organisms is connected to the vascular system of the organ on which they are growing [709].
- A. tumefaciens* (Sm. & Towns.) Conn (*Bacterium t.* Sm. & Towns.): crown gall, tumeur du collet: on 3 cult. BC 31:66, Ont 24:25, NS 51:98; on 13b cult. BC Ont PEI 24:31, BC 39:94, [535], Que NS 25:38, Que 40:82, NB 32:79, NB PEI [1138], NS 47:94; on imported canes Alta 39:94; on 16 BC 31:71, 52:93, 54:115, [535]; on 27 BC 41:80, [535]. Heavy infestations cause lack of vigor in 13b Ont 34:70, Que 50:107, PEI 45:97.
- Apioportha vepri* (de Lacr.) Wehm.: on stems of *R.* sp. NS [1138]; on 17 BC [50].
- Armillaria mellea* (Vahl ex Fr.) Kummer: root rot, pourridié-agaric: on 13b cult. BC 36:65 et seq., [535]; on 21 BC [535].
- Ascospora ruborum* Zeller (*A. rubi* Zeller; stat. conid. *Coryneum ruborum* Oud., *Hendersonia rubi* (West.) Sacc.) cane spot, tache de la tige: on 13b cult. BC 39:94, [50], Ont 33:58, NS 29:58, [1138].
- Aspergillus* sp.: on 13a Alaska [175].
- Botrytis cinerea* Pers.: gray mold, moisissure grise: on 13, 13a, 21, 25 Alaska [175]. As a mold on fruit of 3 BC 31:66; of 13a Man [93, p. 113]; of 13b cult. BC 55:111, Ont 45:97; of 16 BC 31:71. As a wilt of canes of 13b cult. NS 42:88, 48:88, 52:94, 57:107, [1138]; Hockey [459] has described the symptoms. As a wilt of cane tips of 13b BC 52:94, [535], Que 57:107, 58:96.
- Ceratobasidium anceps* (Bres. & Syd.) Jackson: on 13a Ont Que, 24 Ont [495].
- Cicinnobolus cesatii* de Bary: on *Sphaerotheca macularis* (q.v.) on 13b cult. Ont 34:69.
- Clathridium corticola* (Fckl.) Shoem. & Müller (stat. conid. *Seimatosporium lichenicola* (Cda.) Shoem. & Müller): on *R.* sp. Man [997, p. 405]; as *Metasphaeria leiostega* on 13b Man [93, p. 55].
- Coleroa chaetomium* (Fr.) Rabh.: on 7 Labr [52]; on leaves of 21 BC [50].
- Coniothyrium fuckelii* Sacc.: on 13b Man [93, p. 132], Ont 33:121. *C. fuckelii*, *Cylindrocarpon radiculicola* Wr., *Cylindrocladium* sp., *Fusarium* sp., *Pythium* spp., *Rhizoctonia solani* Kühn and *R.* sp. (orchid type) were isolated from naturally infected roots of 13b BC Ont and found experimentally to be capable of producing necrotic lesions on healthy roots. A phycomycetous mycorrhizal fungus (known also on *Fragaria* and *Nicotiana tabacum*) was almost always present [72].
- C. olivaceum* Bon.: on 13a Alaska [175].
- Corticium praestans* Jackson: on stems of *R.* spp. Ont [494, p. 148].
- Cuscuta gronovii* Willd.: dodder, cuscute: on 13b cult. Man 44:94.
- Cylindrocarpon obtusisporum* (Cke. & Harkn.) Wr.: from diseased roots of 13b cult. Alta [210].
- Cylindrocladium scoparium* Morg.: on roots of 13b cult. BC [535].
- Didymella applanata* (Niessl) Sacc. (*Mycosphaerella rubina* (Pk.) Jacz.; stat. conid. *Phoma* sp.): spur blight, brûlure des dards: on 13a Sask 30:98; on 13b cult. BC 33:56, [50, 535], Alta 30:72, Sask 42:88, Man [93, p. 53], Man-Que NS PEI 24:30, NB 29:56, [cf. 1138]; on 16 BC 31:71. One of the destructive diseases of red raspberries wherever they are grown on a large scale. Koch [562] reported in some detail on the etiology of the pathogen.
- Didymosphaeria manitobiensis* Ell. & Ev.: on leaves of 13a Man [93, p. 54].
- Discosia artocreas* (Tode) Fr.: on old leaves of 24 Man [93, p. 133].
- Elsinoë veneta* (Burkh.) Jenkins (*Plectodiscella v.* Burkh.; stat. conid. *Gloeosporium venetum* auct. [*Sphaceloma necator* (Ell. & Ev.) Jenkins & Shear]): anthracnose, anthracnose: on 3 Man 43:90, Ont 24:25, NB 27:40, PEI 58:98; on 13b BC Ont-PEI 24:30, BC 36:63, [535], Sask Man 42:89, Man [93, p. 130], [cf. 1138]; on 19 BC 37:62, Man 44:94, Ont 24:30, Que 33:57. The disease is occasionally severe, especially on some cultivars of 13b, Ont 56:112. Isolations from several cultivars of 13b in the Niagara Peninsula, Ont, yielded two types of growth. Conditions for the production of conidia were reported [549].
- Fabraea cincta* Sacc. & Scalia: on *R.* sp. Alaska [175].
- Fusarium* spp.: from 13b: mainly from wilted canes, *F. avenaceum* (Fr.) Sacc., Ont; *F. equiseti* (Cda.) Sacc., *F. oxysporum* Schlecht., Que; *F. poae* (Pk.) Wr., Ont Que; *F. sambucinum* Fckl., *F. solani* (Mart.) App. & Wr., *F. sporotrichioides* Sherb., Que [335]; *F. avenaceum* on dead canes of 13b BC 43:90, and from lesions on canes of 19 NS [335].
- Gloeosporium allantoporum* Fautr. [*Phlyctaena vagabunda* Desm.]: anthracnose, anthracnose: on 19 BC [1195].

- Gnomonia depressula* Karst.: on *R. sp.*, 13a × 21 Alaska [175]; on dead stems of 21 BC [50].
- G. rostellata* (Fr.) Wehm.: on stems of *R. sp.* NS [1138].
- G. vepri* Mont.: on leaves of 21 BC [50].
- Gymnoconia peckiana* (Howe) Trott. (*G. interstitialis* Lagerh.): orange rust, rouille orangée: 0 I III on 1 Sask 34:108; on 1, 4 Sask, 24 Man [93, p. 64]; on 1, 3, 9, 13a, 13b, 19, 24, 27 Ont [828]; on 3 Ont, 4 Alta, 6 NS [15, p. 96]; on 3, 6, 10, 12, 13a NS, 6 PEI, 24 NB [1138]; on 4, 26 Alaska [175]; on 6 Que 31:124, PEI 34:108; on 24 Que 32:107, NB 30:99. Also on 3 wild, Ont NS 25:28, Que 33:124, NB 26:13, NS 46:72; on 3 cult. BC 30:63, Ont 24:25, Que 29:47. The rust is very destructive to cult. blackberry. The rust was also reported on 13b cult. BC Ont NS 24:30, but very probably in error. Many of these records are uncertain because where they are based on the 0 I states. These states are indistinguishable from those of the endo-form, *Kunkelia nitens* (Schw.) Arth., which may reach Canada.
- Hapalosphaeria deformans* Syd.: dry berry, anther and stigma blight, brûlure des drupéoles: on 13b cult. BC 47:95, [535]; on 16 BC 27:45, 31:71, 32:72, 53:98. Foster first observed dry berry on 16 and attributed the cause to *Bacillus dessicans* Foster [305, p. 533]. Later the blight was attributed to *Hapalosphaeria deformans* [251]. The fungus prevents development of a number of the drupelets and thus the fruit is deformed. There is a possibility that dry berry is a distinct disease.
- Kuehneola uredinis* (Lk.) Arth. (*K. albida* (Kühn) Magn.): rust, rouille: 0 I II III on ?3, 6 Que 31:124; on 4 BC 54:115, [535]; on 8 Ont, 24 NS [15, p. 94]; on 12, 24 NS [1138].
- Lachnum bicolor* (Bull.) Karst.: on 21 BC 34:108.
- Leptosphaeria coniothyrium* (Fckl.) Sacc. (stat. conid. *Coniothyrium fuckelii*, q.v.): cane blight, brûlure de la tige: on 3 BC 30:63; on 13b BC 30:74, [50], Alta 42:89, Sask 55:112, Man 38:88, Sask Man [93, p. 54], Ont 37:63, NB 29:57, PEI 39:94, [cf. 1138]; on 16 BC 31:71; on 19 NS 59:78. Although frequently reported, the fungus is only occasionally destructive in old or neglected plantings. The fungus apparently lives over in the pycnidial state. Koch [562] showed that the disease is distinct from spur blight.
- Leptostroma virgultorum* Sacc.: on 7 Greenl [900].
- Leptothyrium clypeosphaerioides* Sacc.: on 7 Alaska [175].
- L. rubi* (Duby) Sacc.: on 7 Greenl [900].
- L. vulgare* (Fr.) Sacc.: on 26 Alaska [175].
- Meloidogyne sp.* (*Heterodera marioni* (Cornu) Goodey): root knot, nodosité des racines: on 13b BC 48:88.
- Mycosphaerella fructicum* Starb.: on *R. sp.* Alaska [175].
- M. rubi* Roark: reports under this name are placed under *Septoria rubi* (q.v.).
- Naematoloma fasciculare* (Huds. ex Fr.) Karst. (*Hypholoma f.* Huds. ex Fr.): on 13b BC [535].
- Nectria cinnabarina* Tode ex Fr. (stat. conid. *Tubercularia vulgaris*, q.v.): dieback or coral spot, dépérissement nectrien: on *R. sp.* BC [50]; on 13a, 21, 25 Alaska [175]; on 13b NS 51:99.
- Nidula candida* (Pk.) White: on dead canes of 25 Alaska [555].
- Peniophora rimicola* (Karst.) Höhn. & Litsch.: on canes of *R. sp.* Ont [497].
- Peronospora rubi* Rabh.: downy mildew, mildiou: on 17 BC 48:87; on 21, 25 BC 48:88, [535]; on 27a BC [535].
- Pestalotia (Monochaetia) monochaeta* Desm. f. *libertiana* Sacc.: on 13b Alaska [175].
- P. truncata* Lév. var. *rubi* Karst.: on 13a Alaska [175].
- Pezicula rubi* (Lib.) Niessl: on *R. spp.* Ont [365].
- Phoma herbarum* West.: on 7 Greenl [900].
- Phragmidium alaskanum* (Arth.) Syd.: I III on 26 Alaska [15, p. 91; 175].
- P. arcticum* Lagerh.: 0 I II III on 1 Que [828].
- P. occidentale* Arth.: 0 I II III on 21 Alaska [15, p. 83; 175].
- P. rubi-idaei* (DC.) Karst. (*P. imitans* Arth.): yellow rust, rouille jaune: on *R. sp.* Sask 31:124; on 4, 13a, 13b, 26 Alaska [175]; on 13a BC-NS Labr Nfld [15, p. 82], Sask [93, p. 65], [cf. 1138]; on 13b cult. BC 24:31, [535], Alta 33:58, Man [93], Ont 51:99, 54:116, Que 56:111; on 15 BC 54:116, [15, 535]; on 19 BC 48:88, Nfld [15]; on 22 Alaska [1038]. The 13b cultivar Washington, introduced as a rust-free cultivar, first became rusted in 1945, 45:97, and finally proved very susceptible, 53:99; this weakness probably accounts for its replacement by Newburgh, 61:97.
- P. rubi-odorati* Diet.: I II III on 20 Ont [15, p. 83], Ont Que [828].
- Phyllosticta dearnessii* Sacc.: on 24 Man [93, p. 135].
- P. rubicola* Rabh.: on 13a NS [1138].
- Phytophthora sp.*, etc.: root rot, pourridié des racines: *P. sp.* appeared to be the predominant organism isolated from roots of 13b that were suffering from wilt on heavy, poorly drained soil BC 48:88, 53:99, 61:97, [535]; on 16 BC 53:98, 54:115.
- Pleospora nitida* (Ell. & Ev.) Wehm.: on stems of *R. sp.* NS [1138].
- Polyporus varius* Pers. ex Fr.: on dead canes of 25 Alaska [555].
- P. versicolor* L. ex Fr.: on 13b BC 38:88.
- Pratylenchus penetrans* (Cobb) Filipjev & Stekh.: root-lesion nematode, pourridié nématique: in the root zone of 13b BC 57:108; *P. penetrans* and other nematodes associated with root rot and decline of 16 BC 53:98.
- P. pratensis* (de Man) Filipjev (*Anguillulina p.* (de Man) Goffart): meadow nematode, pourridié nématique: in or on the roots of 13b Ont ?BC [72]; from our present knowledge it seems probable that *P. penetrans* (q.v.) was present.
- Pucciniastrum americanum* (Farl.) Arth.: late yellow rust, rouille jaune tardive: II III on *R. spp.* BC Que 33:121, PEI 32:107; on 13a Que 32:107, [8], NS PEI [1138], PEI 30:98; on 13a Ont Que NS, [15, p. 13]; on 13a, 13b Ont, 18 Que [828]; on 13b BC [15]; on 13b cult. Man 42:89, Ont Que NS 31:78, NB 36:64, NB PEI [1138], PEI 38:88, Nfld 58:97. The rust was of no economic importance until the cultivar Viking was grown widely in E. Canada, 38:88. Severe outbreaks cause premature defoliation and much of the fruit is unsaleable because of drupelet infection NB 43:91. The 0 I states were collected on *Picea glauca* near a raspberry planting where the rust had been severe for several years, NB 41:78, 43:91.
- P. arcticum* Tranz.: II III on 1 Alaska [15, p. 11; 175], BC F62:122, Sask [93, p. 63]; on 2 Alaska [175]; on 4 Man [93]; on 7 Alaska [15, 175]; on 24 Alta Man Ont NB [15], Sask Man [93], Ont [828]; on 26 Alaska [15, 175]; on 24 NB NS, but not on 13b PEI as reported, 25:80, [1138].
- Pyrenopeziza rubi* (Fr.) Rehm: on stems of *R. sp.* NS [1138].
- Rhabdospora rubi* Ell.: on canes of 13a Alaska [175];

Rubus

- on 13b Ont 33:56, NS 29:57; doubtfully distinct from *Septoria rubi* (q.v.).
- Rhizoctonia solani* Kühn: root rot, rhizoctone commun: on 13b Que 62:81; see also under *Coniothyrium fuckelii*.
- Rhizopus nigricans* Ehr.: on canes of 13b NS [1138].
- Septoria rubi* West. (stat. perf. doubtfully *Mycosphaerella rubi* Roark): leaf spot, tache septorienne: on *R. sp.*, 25 Alaska [175]; on 3 cult. BC NS 31:66, Ont 24:25, Que 33:49, 36:53; on 5 Man 44:94; on 13a Sask, 24 Man [93]; on 13b BC [50, 535], BC Alta 33:56, Sask 42:89, Man [93, p. 139], Man Ont 24:30, Ont 31:124, Que NS PEI 29:57, Que 33:121, NB 34:67, NB PEI [1138]; on 16 BC 32:72; on 17 BC 47:95, 48:87; on 19, severe, BC 48:88; on 20 Que 33:121; on 21 BC 42:89; on 24 Man 33:121, 40:73; on 25, severe, BC 40:85; on 27 BC 40:85; on 27a BC [535]. This leaf spot is considered a minor disease, but the cultivars differ greatly in susceptibility Ont 40:83, Que 33:56.
- Sphaerella chamaemori* Karst.: on 7 Greenl [900].
- Sphaerotheca fuliginea* (Schlecht. ex Fr.) Poll. (*S. humuli* var. *f.* (Schlecht.) Salm.): reported on 3 cult. Alta 34:61; on 13b BC 25:37, [50], Man 24:30; but its occurrence is doubtful.
- S. macularis* (Wallr. ex Fr.) W.B.Cke. (*S. humuli* (DC.) Burr.): powdery mildew, blanc: on 13a NS [1138]; on 13b, 21, 25 Alaska [175]; on 13b cult. BC 38:88, [50, 535], Alta 30:75, Sask Man [93, p. 44], Sask Que 34:69, Ont NB 28:49, NS 36:64, [cf. 1138]; on 20 Ont 34:108; on 24 Man [93]; on 25 BC 54:117; on 27a BC [535]. Of all the commonly grown cultivars of 13b, Latham has proved the most susceptible.
- Sporidesmium foliculatum* (Cda.) Mason & Hughes (*Helminthosporium orthospermum* Sacc. & Fairm.): on root of 13b NS [1138].
- Stigmatea rubicola* (Ell. & Ev.) Theiss. (*Asterina r.* Ell. & Ev.): on leaves of *R. sp.* BC 33:121, [50]; on 13a Man Ont [93, p. 47].
- Synchytrium vaccinii* Thomas (non *S. aureum* Schroet.): on 12 NS [542]; cf. *Amelanchier*.
- Tubercularia vulgaris* Tode: on 13b Alta 33:121.
- Valsa ceratophora* Tul.: on *R. sp.* BC [50]; on 13a Que [53].
- Venturia kunzei* Sacc.: on *R. sp.*, 22 Alaska [175].
- V. kunzei* var. *ramicola* Sacc. & Scalia: on 26 Alaska [175].
- Verticillium* spp. (*Acrostalagmus caulophagus* Lawr., *V. ovatum* Berk. & Jackson, *V. albo-atrum* Reinke & Berth., *V. dahliae* Kleb.): wilt or blue stem, flétrissure verticillienne: on 13b BC 36:64, Alta 55:112, Sask 50:109, Ont 24:30, Que 26:16, NS 31:77, 43:91, PEI 44:95, [cf. 1138]; on 19 Ont 24:30, 32:78.
- It appears that *V. dahliae* is the predominant species on 13b, although *V. albo-atrum* was reported [690]. Berkeley and Jackson considered that the pathogen on 13b in Ont was a new species, *V. ovatum* [76, p. 268], but later Berkeley et al. [77] called the fungus *V. dahliae*; see under *Solanum*.
- Xiphinema americanum* Cobb: dagger nematode, nématose des racines: in root zone of 13b BC 57:108.
- Black raspberry necrosis virus:** black raspberry necrosis, nécrose de framboisier noir: the virus is latent in some cultivars of 13b, induces mild symptoms in others and causes severe symptoms in 19 [1044]. Of 13 cultivars of *R. spp.* studied in BC, two were immune, two were resistant and nine were susceptible. The virus was acquired with difficulty by *Amphorophora rubi* (Kalt.) from immune cultivars as well as a susceptible one, but it was readily acquired from the other ten [1047].
- Bramble (rubus) yellow net virus:** bramble yellow net, jaunisse réticulée de ronces: on 13b, 19, 23 BC [1048]. The virus was transmitted by *Amphorophora rubi*. It causes a netlike chlorosis of the tissue bordering the smaller veins of the leaf [1043].
- Raspberry leaf curl virus:** leaf curl, frisolée: on 13b BC 61:98, Alta 35:57, Sask 42:90, Man-PEI 24:31; mainly a problem in e. N. America [1048].
- Raspberry necrotic fern leaf mosaic virus:** necrotic fern leaf mosaic, mosaïque nécrotique: on a single plant of 13b Cuthbert Ont; the virus caused a necrotic spotting of the leaf, marked retardation of foliation and an irregular blotch and spot type of mottle [178]. Reported in BC, 41:79, but the diagnosis seems doubtful.
- Raspberry ringspot virus:** ringspot, tache annulaire: on 13b BC 62:82, [1048]; the virus is mechanically transmissible and related to tomato ringspot virus, 62:82, [1049].
- Raspberry vein chlorosis virus:** vein chlorosis, chlorose de nervures: on 13b BC 62:96, [1048].
- Raspberry yellow blotch curl virus:** yellow blotch curl, frisolée jaune: on 13b Ont 36:63, 38:87 et seq.; also reported in BC 41:79. The disease was recognized on Cuthbert in 1935 as distinct from mosaic and leaf curl. It was fairly common in this cultivar and may be causing serious decline in production. It was transmitted to several other cultivars. Foliage of affected plants is pale chlorotic and loosely curled, sometimes with pale blotching and ringspot [177, 1048].
- Thimbleberry ringspot virus:** thimbleberry ringspot, tache annulaire de ronce parviflore: on 21 BC. Although the virus was transmitted to 11, 13b, 19 and 21 [1046], it has been detected in nature only in 21. It has been transmitted only by three species of aphids that colonize thimbleberry [1048].
- Tobacco necrosis virus:** this soil-borne virus infected 13b in the greenhouse and in experimental plots, BC 58:98.
- Virus:** mosaic, mosaïque: on 13b BC Sask-PEI 24:31, BC 53:100, Alta 30:77, Nfld 54:117; on 16 BC 46:73, 50:107, 57:106; on 23 BC 52:93. Mosaic and leaf curl (q.v.) were newly introduced diseases about 1920 when the Canadian Plant Disease Survey was started. By 1921 mosaic was already epidemic in the Niagara Peninsula, Ont, but not elsewhere, 21:34, and certification of disease-free stock was introduced to aid in control, 22:43. It soon became common on wild *R. spp.*, Ont 29:55, NB 23:65. Where roguing was not practised, the yields soon became unprofitable Ont 29:55. Stace-Smith [1045] demonstrated that mosaic in 13b in BC is caused by multiple infection of bramble yellow net virus and black raspberry necrosis virus. These two viruses separately or in combination were transferred by leaf grafting from 13b Cuthbert to *Fragaria vesca*. The large raspberry aphid, *Amphorophora rubi* (Kalt.), transmitted BYNV from strawberry back to raspberry, but not in the reverse direction. Other experiments were unsuccessful [1050]. It seems probable that mosaic in red raspberry in other parts of Canada is also the result of infection by these two viruses.
- Virus:** blackberry mosaic, mosaïque de ronce: on 3 Ont 25:28, Que 24:25, NS 38:76, on wild *R. sp.* BC 52:93.
- Miscellaneous, apparently virus, diseases:** raspberry severe leaf curl, an apparently unrecorded virus disease on 13b BC 52:96; yellow mosaic on 13b Ont 48:89, 50:109; crumble berry on 13b BC 51:100.

Chemical injury: from herbicide on 13b BC 49:90.
 Iron deficiency, carence de fer: mainly lime-induced, on 13b BC 56:95, Sask Ont 50:109, Man 43:91, 55:112, 61:98.
 Magnesium deficiency, carence de magnésie: on 3 PEI 58:98.
 Potassium deficiency, carence de potasse: leaf scorch, pyrolose: on 13b Ont 38:88, 39:95, PEI 40:83.
 Low temperature, basse temperature: winter injury, gelure: on 13b BC 37:64, Alta Sask Ont Que NS 52:96, Ont 22:46, Que 32:79, PEI 42:90, 54:117; on 16 BC 54:115.

Rudbeckia L.

COMPOSITAE

Mainly perennial herbs of N. America.

1. *R. laciniata* L. (*R. ampla* Nels.); in Canada from NS and Que to Man. 1a, *R. l.* var. *hortensis* Bailey, golden glow, rudbeckie lacinée; commonly cult.
2. *R. serotina* Nutt. (*R. hirta* auct.), brown-eyed susan, marguerite jaune; BC to Man, adventive eastward in Que to NS and Nfld.

Colletotrichum rudbeckiae Pk.: on old stems of 1 Man [93, p. 129].

Entyloma davisii Cif.: on 2 Ont [292, 946].

Erysiphe cichoracearum DC. ex Méral: powdery mildew, blanc: on 1 BC [50], Man [93, p. 44], Man Ont 33:121; on 1a BC Que 34:85, Alta 29:68, Man [93], Ont 31:93, 45:121, NB 33:69, [1138].

Phyllosticta rudbeckiae Ell. & Ev.: on 1 Man [93, p. 136].

Plasmopara halstedii (Farl.) Berl. & de Toni: on 1 Man 33:122, [93, p. 31].

Ramularia rudbeckiae Pk.: on leaves of 1 Man [93, p. 125].

Sclerotinia sclerotiorum (Lib.) de Bary: wilt, flétrissure sclérotique: on 1a Man 35:68, [93, p. 42], NS 25:70.

Septoria rudbeckiae Ell. & Halst.: on 1 Man 34:109, [93, p. 139].

Uromyces perigynius Halst.: 0 I on 1 Man 34:109, [15, p. 200; 93, p. 73].

U. rudbeckiae Arth. & Holw.: III on 1 Man [15, p. 101; 93, p. 73], Ont [15, 828].

Aster yellows virus: aster yellows, jaunisse de l'aster: on R. sp. NB 30:86, 35:66, 37:75.

Rumex L.

POLYGONACEAE

Perennial or annual herbs essentially cosmopolitan.

1. *R. acetosa* L., garden sorrel, grande oseille; introduced from Europe, occurs in all provinces and may be locally abundant in the east.
2. *R. acetosella* L., sheep sorrel, petite oseille; naturalized from Europe, occurs in all provinces and is common in s. BC and E. Canada.
3. *R. arcticus* Trautv.; in the western arctic of Canada, Alaska and n. Eurasia.
4. *R. crispus* L., curled dock, patience sauvage;

naturalized from Europe, occurs across Canada but is most abundant in E. Canada.

5. *R. longifolius* DC. (*R. domesticus* Hartm.); naturalized from Europe; Nfld and PEI to Man; also in BC.
6. *R. mexicanus* Meisn.; Nfld, NB and Que to Man, Alta and BC.
7. *R. obtusifolius* L., bitter dock, patience; naturalized from Europe; in E. Canada.
8. *R. occidentalis* Wats.; Labr, Nfld and NS to Alta and Alaska.
9. *R. orbiculatus* Gray (*R. britannica* auct.), yellow dock; in Canada from Nfld and NS to Man.
10. *R. venosus* Pursh, wild begonia; Man, Sask and Alta to Calif.

Apiospora sp.: on 4 Alaska [1038].

Lamproderma columbinum (Pers.) Rostr.: on 5 Greenl [900].

Mollisia cinerea (Batsch) Karst.: on 5 Greenl [900].

Mycosphaerella stromatoidea Dearn.: on living leaves of *R. spp.* BC [50]; on 7 Alaska [175].

M. tassiana (de Not.) Johans.: on 2 BC [50].

Olpidium sp.: on 4 Ont 32:108.

Pleospora herbarum (Fr.) Rabh.: on *R. sp.* BC [50].

Puccinia acetosae Koern.: on 2 NS [1138]; only II known in N. America [15, p. 281].

P. ornata Arth. & Holw.: III on *R. spp.* Alta Man [15, p. 156]; on 8 Alta Sask Man [93, p. 70]; on 9 Sask [15].

P. phragmitis (Schum.) Koern.: 0 I on 6 Man [15, p. 155; 93]; on 8 Man [93, p. 70].

Ramularia pratensis Sacc.: on 8 Alaska [175].

R. rubella (Bon.) Nannf. (*Ovularia obliqua* (Cke.) Oud., *R. circumfusa* Ell. & Ev., *R. decipiens* Ell. & Ev., *R. rumicis* Kalchbr. & Cke.): on *R. sp.* Alaska [175]; on 4 Man [93, p. 124], NS [956]; on 7 Que 33:122, NS [956]; on 10 Man [93].

Sclerotium durum Pers.: on 2 Greenl [900].

Septoria pleosporioides Sacc.: on 1, 2 Greenl [900].

Ustilago parlatorei Fisch. v. Waldh.: on 4 Man [953].

U. vinosa (Berk.) Tul.: on 3 Mack [953, 958].

Venturia rumicis (Desm.) Wint. (*Mycosphaerella r.* (Desm.) Lindau): on living leaves of 2 BC [50], Que [53]; on 7 Nfld [52]; on 8 Alaska [175].

Sagina L.

CARYOPHYLLACEAE

Herbaceous plants of cool or temperate regions.

1. *S. caespitosa* (J.Vahl) Lange; arctic Canada and Greenl.
2. *S. intermedia* Fenzl (*S. nivalis* auct.); Greenl, Labr, Frank, Alaska and arctic Eurasia.

Leptosphaeria stellariae Rostr.: on 1 Labr [52].

Mycosphaerella tassiana (de Not.) Johans.: on 2 Greenl [602, 603].

Septoria nivalis Rostr.: on 2 Greenl [899].

Sagittaria L.

ALISMATACEAE

Aquatic, mostly perennial herbs of tropical and temperate regions especially of the western hemisphere.

1. *S. cuneata* Sheldon (*S. arifolia* Nutt.); in Canada from NS and Que to Mack and BC.
2. *S. latifolia* Willd., waput, wapaton; in Canada from NS, NB and Que to BC.

Burrillia pustulata Setch.: on 2 Ont [292].

Cercospora sagittariae Ell. & Kell.: on 2 Man [93, p. 115].

Doassansia deformans Setch.: on 2 Man [93, p. 60], Man Ont [292].

D. furva Davis: on 2 Man [93, 292].

D. intermedia Setch.: on 1 Sask [93, 292]; on 2 Man [93], Man Ont [292].

D. opaca Setch.: on 2 Ont [292].

D. sagittariae (West.) Fisch.: on *S. sp.* Man [93]; on 1 BC [957], Sask [93, 292]; on 2 BC [957], Man [93], Man Ont [292].

Fusarium acuminatum Ell. & Ev.: from basal parts of 2 Man [93, p. 118; 335].

Gloeosporium confluens Ell. & Dearn.: on leaves of 2 Man [93, p. 130].

Rhynchosporium alismatis (Oud.) Davis: on leaves of 2 Man [93, p. 126].

Saintpaulia Wendl.

GESNERIACEAE

Mostly acaulescent hairy perennials of tropical Africa.

1. *S. ionantha* Wendl., African violet, violette africaine; e. Africa; widely cult. as an indoor pot plant.

Erysiphe cichoracearum DC. ex Méral: powdery mildew, blanc: on 1 Ont 54:137.

Meloidogyne incognita (Kofoid & White) Chitwood or *M. sp.*: root-knot nematode, nodosité des racines: on 1 Ont 56:131, NS 58:120, and on newly imported plants, BC 60:107, Alta 53:123.

Pratylenchus penetrans (Cobb) Filip. & Stekh.: root-lesion nematode, nématose des racines: on 1 BC 57:129.

Pythium ultimum Trow: root rot, pourridié des racines: this fungus was the primary pathogen in root and crown rot of 1 Ont 52:119. However, healthy plants set in infested soil became infected only when they were subjected to prolonged exposure to light of very high intensity or the roots were already infested by the root-knot nematode *Meloidogyne sp.* [1079].

Virus: leaf curl, frisolée: on 1 Ont 52:119.

Chemical injury: from paint fumes BC 58:120.

Cold water, eau froide: ring pattern, anneaux: on 1 BC 55:126; not uncommon where care is not taken in watering.

Salicornia L.

CHENOPODIACEAE

Low herbs of saline soil, semicosmopolitan.

1. *S. europea* L. (*S. herbacea* L.), sand-fire, corail; in Canada in PEI, NS, NB and Que.

2. *S. pacifica* Standl.; BC to Calif; possibly not distinct from *S. virginica* L. (*S. ambigua* Michx.); in e. U.S.

Uromyces peckianus Farl.: 0 I on 1 NS [15, p. 160; 1138]; on 2 BC [15].

Salix L.

SALICACEAE

Trees or shrubs of cold to warm-temperate regions mostly in the northern hemisphere.

1. *S. alaxensis* (Anderss.) Coville; arctic eastern Canada to Alaska and Asia.
2. *S. alba* L.; white willow, saule; Eurasia and n. Africa. 2a, *S. a. var. calva* G.F.W.Mey.; introduced from Europe and common. 2b, *S. a. var. tristis* Gaud., white weeping willow, saule pleureur blanc. 2c, *S. a. var. vitellina* (L.) Stokes; naturalized from Europe and very common.
3. *S. amygdaloides* Anderss., peach-leaved willow; in Canada from Que to BC.
4. *S. arctica* Pall. (*S. angulorum* Cham.); arctic eastern Canada, Que, Nfld, Alta and BC and also Eurasia. 4a, *S. a. var. brownei* Anderss.
5. *S. arctophila* Cock. (*S. groenlandica* (Anderss.) Landst.); Nfld, Labr, Que, Ont, Man, Keew, Frank and Mack.
6. *S. babylonica* L., weeping willow, saule pleureur; introduced from Europe; much cult. and locally spread in Que and Ont. 6a, *S. b. var. aurea*.
7. *S. bebbiana* Sarg. (*S. rostrata* Richards.), long-beaked willow, chatons; in Canada from Nfld and NS to Alaska. 7a, *S. b. var. perrostrata* (Rydb.) Schneid.; Labr and Nfld to Alaska.
8. *S. discolor* Muhl., large pussy willow, chatons; in Canada from Labr, Nfld and NS to Alta.
9. *S. fragilis* L., brittle willow, saule; naturalized from Nfld to Alta.
10. *S. glauca* L., (including *S. seemanii* Rydb.); Alaska to BC, Alta and Mont. 10a, *S. g. var. aliceae* C.R.Ball. 10b, *S. g. var. glabrescens* (Anderss.) Schneid.
11. *S. herbacea* L.; Frank to Greenl and Eurasia.
12. *S. hookeriana* Barratt; BC to Oregon and Calif.
13. *S. lasiandra* Benth.; BC and Alta to Calif.
14. *S. laurifolia* Wesm.; apparently not distinct from 16.
15. *S. lucida* Muhl., shining willow, saule; in Canada in Labr and Nfld and from NS to Man.

16. *S. pentandra* L., bay-leaved willow, saule; introduced from Europe and spread from cult. from NS to Ont.
17. *S. purpurea* L., basket willow, osier rouge; introduced from Europe and now naturalized from Nfld to Ont. 17a, *S. p.* var. *gracilis* Gren. & Godr.
18. *S. reticulata* L.; arctic and alpine regions of N. America and Eurasia. 18a, *S. r.* var. *gigantifolia* C.R. Ball.
19. *S. scouleriana* Barratt; Alaska to BC, Mont and Calif. 19a, *S. c.* f. *poikila* Schneid.
20. *S. sitchensis* Bong; Alaska to BC, Ore and Mont.
21. *S. viminalis* L., osier, osier vert; introduced from Europe and now spread from cult. from Nfld and NS to Que.

Other hosts: 22, *S. arbusculoides* Anderss. 22a, *S. a.* var. *glabra* Anderss. 23, *S. barclayi* Anderss. 24, \times *S. blanda* Anderss. 25, *S. candida* Flügge. 26, *S. chamissonis* Anderss. 27, *S. commutata* Bebb. 28, *S. cordata* Michx. 29, *S. cordifolia* Pursh and *S. c.* var. *calli-carpaea* (Trautv.) A.Löve. 30, *S. fuscescens* Anderss. 31, *S. glaucops* Anderss. 32, *S. myrsinites* L. 33, *S. myrtilifolia* Anderss. 34, *S. ovalifolia* Trautv. 34a, *S. o.* var. *canadensis* Schn. 35, *S. pellita* Anderss. 36, *S. petrophila* Rydb. 37, *S. phlebophylla* Anderss. 38, *S. planifolia* Pursh. 39, *S. polaris* Wahl. 40, *S. pulchra* Cham. 41, *S. pyrifolia* Anderss. (*S. balsamifera* Barratt). 42, *S. richardsonii* Hook. 43, *S. niphoclada* Rydb. 44, *S. rotundifolia* Trautv. 45, *S. rubra* Huds. 46, *S. serissima* (Bailey) Fern. 47, *S. stolonifera* Coville. 48, *S. uva-ursi* Pursh. 49, *S. podophylla* Rydb..

- Agrobacterium tumefaciens* (Sm. & Towns.) Conn: crown gall, tumeur de collet: on hedge of *S.* sp. Que F58:57; on 2b Que 56:120; on 6 BC 59:84.
- Aleurodiscus cerussatus* (Bres.) Höhn. & Litsch.: common on *S.* spp. Man [93, p. 75; 599].
- A. oakesii* (Berk. & Curt.) Höhn.: on *S.* sp. NS [599].
- A. roseus* (Pers. ex Fr.) Höhn. & Litsch. (*Corticium roseum* Pers. ex Fr.): on old *S.* sp. Man [93, p. 76].
- Antennatula arctica* Rostr.: on 5 Greenl [900]; on 10 Greenl [901].
- Anthostoma melanotes* (Berk. & Br.) Sacc.: on decorticated wood of *S.* sp. NS [1138].
- Armillaria mellea* (Vahl ex Fr.) Kummer: on *S.* sp. BC [1198].
- Asteroma salicis* Rob. & Desm.: on 5 Greenl [899, 900].
- Ceratostoma foliicola* Fckl.: on 5 Greenl [899].
- Cercospora salicina* Ell. & Ev.: on *S.* sp. Man [93, p. 115].
- Chromocrea gelatinosa* (Tode) Seav.: on *S.* sp. Man [93, p. 45].
- Ciboria pamentacea* (Balbis) Fckl.: on fallen catkins of *S.* sp. Man [93, p. 39].

- C. caucus* (Rebent. ex Pers.) Fckl.: on *S.* sp. Greenl [901].
- Ciborinia foliicola* (Cash & Davidson) Whetz.: on *S.* sp. Que F60:44.
- Cladosporium herbarum* (Pers.) Lk.: on *S.* sp. Alaska [175, 250]; on 5 Greenl [901, 902].
- Collybia velutipes* (Curt. ex Fr.) Kummer: recorded on *S.* sp. BC [1198].
- Columnophora rhytismatis* (Bres.) Bubák & Vleugel: on *Rhytisma salicinum* on 4 Frank [971].
- Coniosporium phaeospermum* (Cda.) Sacc.: on 5 Greenl [901].
- Coniothecium coloratum* (Pk.) Rostr.: on wood of 4 Frank [903, p. 10]; the basionym is not given and if the binomial is based on *Ascochyta colorata* Pk. the determination is incorrect.
- C. complanatum* (Nees) Sacc.: on 5 Greenl [901]; on 10 Greenl [900].
- Coniothyrium fuligineum* (Karst.) Sacc.: on 34 Alaska [175].
- Constantinella terrestris* (Lk.) Hughes (*C. tillettei* (Desm.) Mason & Hughes): on 1 Alaska [1038].
- Coriolellus heteromorphus* (Fr.) Bond. & Singer (*Trametes heteromorpha* (Fr.) Bres.): on *S.* sp. Alaska [175].
- Corticium bombycinum* (Sommerf.) Bres.: on *S.* sp. NS [1138]; see *Acer*.
- C. comedens* (Nees) Fr.: on 10 Greenl [900]; see *Alnus*.
- C. contiguum* Karst. (*C. crustaceum* (Karst.) Höhn & Litsch.): on *S.* sp. BC [1198], Man [93, p. 75].
- C. deflectens* (Karst.) Karst.: on *S.* sp. BC [1198]; ? on *S.* sp. NS [1138].
- C. lacteum* Fr. nom. dub.: on 5, 10 Greenl [901].
- C. laeve* Pers. ex Fr. (*C. evolvens* Fr.): on *S.* sp. Greenl [899]; see *Abies*.
- C. porosum* Berk. & Curt.: on *S.* sp. BC [1198]; on 1 Alaska [1038]; see *Alnus*.
- C. roseum* Pers. ex Fr. [*Laeticorticium r.* (Pers. ex Fr.) Donk]: on old *S.* sp. Man [93, p. 76].
- C. udicola* Bourd.: on *S.* sp. BC [1198].
- C. vellereum* Ell. & Cragin: on old *S.* sp. [93, p. 76].
- Coryneum salicinum* (Cda.) Sacc.: on *S.* sp. Alaska [175].
- Crepidotus fulvotomentosus* Pk.: on *S.* sp. and recorded on 20 BC [1198].
- Cryptodiaporthe salicella* (Fr.) Petr. (*C. salicina* (Curr.) Wehm.; stat. conid. *Discella carbonacea*, q.v.): canker, chancre: on *S.* spp. Alaska [175], BC [50], Ont F60:67, NS [1138]; on young 12, 19 BC; high bark moisture in the dormant season reduces or prevents canker development [82].
- Cryptomyces maximus* (Fr.) Rehm: on *S.* sp. BC F57:87, [1199]; on 35 Sask 38:94.
- Cylindrosporium salicinum* (Pk.) Dearn.: on *S.* sp. Alaska [175], Que F61:53.
- Cytidia flocculenta* (Fr.) Höhn. & Litsch.: on *S.* sp. Alaska [175].
- C. salicina* (Fr.) Burt (*Corticium salicinum* (Fr.) Fr.): on *S.* sp., 1 Alaska [175]; on *S.* sp. BC [1198], Greenl [899].
- Cytospora* sp.: on 20 BC 41:85.
- C. ambiens* Sacc.: on *S.* sp. Man [93, p. 132].
- C. capitata* Fckl.: on 5 Greenl [899].
- C. ?capreae* Fckl.: on twigs of *S.* sp. Man [93, p. 133].
- C. chrysosperma* (Pers.) Fr.: on *S.* spp. Alta Sask 31:87, Sask F51:144, F52:97, Ont 58:109; on *S.* spp. NB NS, 6 NS 31:87, [1138]; on 2b Man 46:79, Que

- 59:84; on 6 BC [1198]; on 14 Sask 30:83; on 16 Sask [93, p. 133].
- Cytospora nivea* (Hoffm.) Sacc.: on 5, 10 Greenl [901].
- C. pulcherrima* Dearn. & Hansbr.: on *S. sp.* BC [253].
- C. salicella* Sacc.: on 5 Greenl [901].
- C. salicis* (Cda.) Rabh.: on 4 Greenl [603]; on 5, 10 Greenl [901]; on 10 Greenl [900]; on 43 Alaska [604].
- Cytosporium heclae* Rostr.: on 5 Greenl [901, p. 70].
- Daedalea confragosa* Bolt. ex Fr.: on *S. spp.* Alaska [175], BC F53:156, Yukon F62:121, Man [93, p. 81], NS [1138]; on 1 Alaska [555].
- D. unicolor* Bull. ex Fr.: on *S. sp.* Man [93, p. 81, 167], Yukon F62:121; see *Acer*.
- Dasyscyphus bicolor* (Bull. ex Fr.) Fckl.: on 5 Greenl [901].
- D. calyculiformis* (Schum. ex Fr.) Sacc.: on *S. sp.* Alaska [176]; on 20 Alaska [1038].
- D. corticalis* (Pers. ex Fr.) Karst. (*Lachnella c.* (Pers. ex Fr.) Fr.): on 5 Greenl [901].
- D. virgineus* (Batsch ex Fr.) Fckl.: on 1 Alaska [176, 1038].
- Dendryphon fumosum* (Cda.) Fr.: on *S. sp.* Greenl [901].
- Diaporthe eres* Nit.: on 6 BC [50].
- D. salicella* (Fr.) Sacc.: on 5 Greenl [901].
- D. tessella* (Pers.) Rehm.: on twigs and branches of *S. spp.* Sask 35:64, Sask Man [93, p. 57], Ont F60:67, NS [1138]; on 38 Sask 38:94.
- Diatrype albopruinosa* (Schw.) Cke. var. *salicina* Rehm: on branches of *S. sp.* Man [93, p. 59].
- D. bullata* (Hoffm. ex Fr.) Fr.: dieback, dépérissement diatrypéen: on *S. sp.* Alaska [175], BC F55:106, [50, 1198].
- D. corniculata* (Ehrh.) Berk. & Br.: on 10 Greenl [900].
- D. stigma* Hoffm. ex Fr.: very common on branches of *S. sp.* Man [93, p. 59].
- Diatrypella melaleuca* (Kze.) Nits.: on 5 Greenl [901].
- D. verruciformis* (Ehrh.) Nits.: on 5 Greenl [901]; on 10 Greenl [900].
- Didymella canadensis* Ell. & Ev.: on dead limbs of *S. sp.* Man [93, p. 53].
- D. exigua* (Niessl) Sacc.: on *S. sp.* Frank, 29 Que [52].
- Diplodina salicina* Cke. & Massee: on 2c NS [1138].
- D. salicis* West.: twig blight, brûlure des rameaux: on *S. sp.* Sask 49:98, Man [93, p. 133], Que 34:77, NB F56:27; probably a stat. conid. of *Cryptodiaporthe salicella* (q.v.) [1138].
- Discella carbonacea* Berk. & Br.: on *S. sp.* NS F54:25, [1138].
- Discula microsperma* (Berk. & Br.) Sacc.: on 5 Greenl [901]; probably a state of *Cryptodiaporthe salicella* (q.v.) [1138].
- Dothiopsis salicis* (Karst.) Allesch.: on 4 Greenl [603].
- Dothiorella pyrenophora* (Karst.) Sacc.: on 10 Greenl [900].
- D. pyrenophora* var. *salicis* Karst.: on *S. sp.* Alaska [175].
- Drepanopeziza salicis* (Tul.) Höhn. (*Pseudopeziza s.* (Tul.) Pot.): leaf spot, tache des feuilles: reported on *S. sp.* Que 25:68; the record is probably based on a collection of the conidial state, *Gloeosporium salicis*, q.v.
- D. sphaerioides* (Pers. ex Fr.) Nannf. (*Pyrenopeziza s.* (Pers. ex Fr.) Fckl.): on 4 Greenl [603]; on 10 Greenl [901].
- Eutpya acharii* Tul.: on branches of *S. sp.* Man [93, p. 57].
- E. lata* (Pers.) Tul.: on bark of *S. sp.* Sask Man [93].
- Exidia glandulosa* Bull. ex Fr.: on *S. sp.* BC [1203], Man [93, p. 74]; on 1 Alaska [175].
- E. recisa* (Dittm.) Fr.: on 10 Greenl [900].
- Favolus alveolaris* (Fr.) Quél. (*F. canadensis* Klotzsch): on *S. sp.* Alaska [175], Man [93, p. 81].
- Fenestella princeps* Tul.: on 10 Greenl [900].
- Fomes annosus* (Fr.) Karst.: on 1 Alaska [1038].
- F. conchatus* (Pers. ex Fr.) Gill.: on *S. sp.* NS [1138].
- F. connatus* (Weinm.) Gill.: on dead *S. sp.* BC F53:156, [1198].
- F. ignarius* (L. ex Fr.) Kickx: white trunk rot, carie blanche du tronc: on or from *S. spp.*, BC F57:87, [791, 1199], Man [93, p. 81], NB 26:33, [1138], Nfld F54:24; common on living 1 Alaska [555].
- F. ignarius* var. *nigricans* auct. Am.: on 1 Alaska [175].
- Fumago vagans* Pers.: on 5 Greenl [900, 901].
- Fusicoccum* sp.: on 4 Frank; the fungus appears to be close to *F. leucostomum* Sacc., the conidial state of *Cryptodiaporthe apiculata* (Wallr.) Petr. [971].
- Fusicolla corticalis* Karst.: on 10 Greenl [900].
- Gloeosporium boreale* Ell. & Ev. [*Kabatiella borealis* (Ell. & Ev.) Arx, 15a, p. 65]: on leaves of *S. sp.* Que 31:88.
- G. salicis* West. [*Monostichella s.* (West.) Arx]: anthracnose, anthracnose: on *S. sp.* Alta 34:109, Man [93, p. 130], Ont 25:67, Que 31:88, NS 30:84, [1138]; on 2c Man 43:99.
- Gnomonia* sp.: on 42 Alaska [175, 250].
- G. salicella* (Fr.) Schroet.: on 4 Greenl [601].
- Godronia fuliginosa* (Pers.) Seav. (*Scleroderis f.* (Fr.) Karst.): on *S. sp.* Ont [977, p. 344; 979]; on *S. sp.*, 42 Alaska [175, 250]; on 35 Sask 38:94.
- Helicogloea pinicola* (Bourd. & Galz.) Baker: on wood of *S. sp.* Ont [45].
- Helotium aciculare* (Bull. ex Fr.) Pers.: on 5 Greenl [900].
- H. amenti* (Batsch) Fckl.: on fallen catkins of *S. sp.* Man [93, p. 40].
- H. citrinum* (Hedw.) Fr.: on *S. sp.* BC [1198].
- H. salicellum* Fr.: on twigs of *S. sp.* Man [93, p. 40].
- H. uliginosum* Fr.: on *S. sp.* Greenl [900]; on 5 Greenl [901].
- Hymenochaete agglutinans* Ell.: on *S. sp.* Alaska [175].
- H. tabacina* (Sow. ex Fr.) Lév.: on *S. spp.* Alaska [175], BC [1198], NS [1138]; from 1 Alaska [555].
- Hypospila groenlandica* Rostr.: on *S. sp.* Yukon [600]; on fallen leaves of 10 Greenl [899, p. 561].
- Hypoxylon arcticum* (Fckl.) Rostr. (*Rhizomorpha arctica* Fckl.): on 5 Greenl [899].
- H. macrosporum* Karst.: on 10 Greenl [900].
- H. mammatum* (Wahl.) Miller (*H. blakei* Berk. & Curt., *H. morsei* Berk. & Curt.): on *S. sp.* BC [1199], NS [1138], Nfld F53:24; on 1 Alaska [175]; on 38 Sask 38:94.
- Hysterographium mori* (Schw.) Rehm: common on old wood especially of *S. spp.* Man [93, p. 43].
- Hysteropatella elliptica* (Fr.) Rehm: on wood of *S. spp.* Man [93, p. 40].
- Lachnella flammea* (Alb. & Schw.) Fr.: on 5 Greenl [901].
- Lasiosphaeria hirsuta* (Fr.) Ces. & de Not.: on old wood of *S. spp.* Man [93, p. 51].
- L. ovina* (Pers.) Ces. & de Not.: on old wood of *S. spp.* Man [93].
- Lenzites betulina* (L. ex Fr.) Fr.: on *S. sp.* NS [1138].
- Leptosphaeria borealis* Ell. & Ev.: on 40 Mack [250].

- Leptosphaeria coniothyrium* (Fckl.) Sacc.: on 5 Greenl [901]; on 10 Greenl [899].
- Leptostroma punctiforme* Wallr.: on 10 Greenl [899].
- Leptothyrium pulchrum* Dearn.: on 40 Alaska [175; 250, p. 18C.].
- Linospora insularis* Johans.: on leaves of *S. sp.* BC [50]; on *S. sp.*, 4, 18 Frank [600].
- Lophiostoma erosum* Ell. & Ev.: on dead branches of *S. spp.* Man [93, p. 52].
- L. sexnucleatum* Cke.: on branches of *S. spp.* Man [93, p. 53].
- L. triseptatum* Pk.: very common on branches of *S. spp.* Man [93].
- Lophium dolabriforme* Wallr.: on 1 Alaska [175]; on 5, 10 Greenl [901].
- Lophodermium hysterioides* (Pers.) Sacc.: on 5 Greenl [901]; on 10 Greenl [899, 901].
- L. maculare* (Fr.) de Not.: on *S. sp.* Alaska [175].
- L. versicolor* (Wallr.) Schroet.: on 4a Frank [600].
- Lycoperdon pusillum* Batsch: on roots of *S. sp.*, 7 NS [1138].
- Macrophoma salicis* Dearn. & Barth.: on twigs of *S. spp.* Man [93, p. 134]; from the measurements given by Bisby, the fungus may be the conidial state of *Cryptodiaporthe pulchella* (Sacc.) Butin, [cf. 154, p. 407].
- Macrosporium concinnum* Berk. & Br.: on 10 Greenl [901].
- Marasmius candidus* Bolt. ex Fr.: on *S. sp.* Greenl [900].
- M. epiphyllus* Fr.: on 10 Greenl [900].
- Marssonina apicalis* (Ell. & Ev.) Sprague: on 47 Alaska [1038].
- M. kriegeana* (Bres.) Magn.: anthracnose, tache des feuilles: on 2b Que 56:120; on 6 BC 43:99, 53:111, [1198], Sask F52:97; apparently sometimes severe BC 52:107. The perfect state, *Drepanopeziza triandrae*, was described by Rimpau [887].
- M. lindii* Nannf. (not *M. obscura* (Rom.) Magn.): on *S. sp.* Frank [600]; on 4 Frank [971].
- M. populi* (Lib.) Magn.: on *S. sp.* NS PEI 26:33, [1138].
- M. salicicola* (Bres.) Magn.: on 6 BC [1198]; the fungus is reported to be the conidial state of *Drepanopeziza sphaerioides* (q.v.). The study by Rimpau [887] suggests that the species of *Marssonina* in N. America are poorly understood.
- Melampsora abietis-capraearum* Tub. (*M. americana* Arth., *M. humoldtiana* Speg.): rust, rouille: II III on *S. spp.* BC 33:122, [1202], Mack 40:100, Man [93, p. 63], Ont F52:85, Que 35:63, NB PEI Nfld F53:25, NS [1138]; on 7 in association with *Larix occidentalis* BC 53:111; on 7 Alta NB 47:102, NS [1138]; on 8 NS 39:100, [1202], NS PEI [1138]; on 17a Man 43:99; on 25 Sask [93]; on 28 Man [93]; on 35 Sask 35:63; on 45 Ont 43:99; on ten *Salix spp.* BC Alta Man Ont Que NS [13, cf. 15, p. 55].
- M. arctica* Rostr.: II III on *S. spp.* BC 34:109; on 1, 4, 23, 27 Alaska [1038]; on 4 × 10 Greenl [602]; on 4 Frank Greenl [903]; on 4 Alta BC, 5, 10, 11 Greenl, 20 Alaska, 22 Alta, 26, 30 Alaska, 31, 33 Alta, 34 Alaska, 36 BC Alta, 39 Alaska, 41 Alta, 47 Alaska [15, p. 56]; on 4 Greenl [601, 902]; on 4, 10a, 10b, 20, 22, 22a, 26, 30, 34, 39, 40, 47 Alaska [175]; on 5, 10 Greenl [901]; on 5, 10, 11 Greenl [899, p. 535]; on 5 Que, 11 Frank [605]; on 11 Greenl [603]; on 18 Frank [604].
- M. epitea* Thüm.: II III on *S. spp.* Alta F53:133, Que 59:85; on 4 Frank [961, 971]; on 19, 20 BC [1198].
- M. epitea* f. *sp. tsugae* Ziller: II III on *S. sp.* (*M. sp.*) BC F52:153; on 19a, 20 by inoculation BC [1202, p. 115].
- M. paradoxa* Diet. & Holw. (*M. bigelowii* Thüm.): II III on *S. spp.* Alaska [555], BC 34:77, Alta Sask F51:144, Mack 40:100, Ont 24:53, Que 32:108; on *S. sp.*, 1, 4, 10, 18, 20, 22, 23, 34a, 36, 40, 47 Alaska [175]; on *S. sp.* Sask, 3, ?11 Man [93, p. 63]; on *S. sp.* NB NS PEI, 7 NS [1138]; on *S. sp.*, 4 Frank Que, 18 Que [605]; on 1, 4, 20, 23, 27, 47 Alaska [1038]; on 2c Ont 47:102; on 4 Mack, 34a, 39 Alaska [14]; on 13 BC [1198, 1202]; on eleven *Salix spp.* Alaska BC Alta Ont [13].
- M. ribesii-purpureae* Kleb. (*M. confluens* Jackson): II III on *S. sp.* NS [1138]; on *S. sp.*, 1, 10 var., 18, 19 Alaska [175]; on 1, 19, 30, 49 Alaska [555]; on 7 Alta 24:53; on 7a BC, 10 Yukon, 19 Alaska BC [13].
- M. ribesii-salicinum* Bubák: II III on 10 Yukon [14]. At present all collections of *Melampsora* on *Salix* are best referred to *M. epitea* (q.v.).
- Melanomma cinereum* (Karst.) Sacc.: on 5 Greenl [899]; on 6 BC [50]; on 42 Yukon [604].
- M. pulvis-pyrus* (Pers.) Fckl.: on *S. sp.* Alaska [175], BC F57:87, [1199].
- M. salicinum* Rostr.: on 5 Greenl [901]; on 10 Greenl [900, p. 619].
- Merulius confluens* Schw.: on 1 Alaska [1038]; on 19 BC F58:103, [1203].
- Metasphaeria cinerea* (Fckl.) Sacc.: on *S. sp.* Alaska [175]; on 10 Greenl [900].
- Mollisia cinerea* (Batsch) Karst.: on old wood of *S. spp.* Man [93, p. 40]; on *S. sp.* Greenl [900]; on 5, 10 Greenl [901].
- M. sublivida* (Nyl.) Karst.: on 1 Alaska [175].
- Mycosphaerella capronii* (Sacc.) Lind (*Sphaerella c.* Sacc.): on leaves of *S. sp.* Labr [52]; on *S. sp.* Greenl [901]; on 4, 40, 42 Yukon [600, p. 16]; on 42 Man [604].
- M. maculiformis* (Pers. ex Fr.) Schroet.: on *S. sp.* Que [52].
- M. minor* (Karst.) Johans.: on 48 Que [52].
- M. salicicola* (Fr.) Lind (*Sphaerella s.* (Fr.) Fckl.): on 4 Greenl [603]; on 10 Greenl [900]; on 11 Greenl [899, 901], Que [605].
- M. tassiana* (de Not.) Johans.: on 4 Greenl [602].
- Myxosporium salicinum* Sacc.: on 5 Greenl [901].
- Naemospora microspora* Desm.: on 5 Greenl [900].
- Nectria cinnabarina* Fr.: on *S. sp.*, 17, 21 Alaska [175].
- N. coccinea* Pers. ex Fr.: on *S. sp.* BC F57:87, [1199].
- N. coryli* Fckl.: on *S. sp.* Alaska [175], NS [1138]; on 10 Greenl [900].
- N. episphaeria* Tode ex Fr.: on 10 Greenl [900].
- N. galligena* Bres.: on *S. sp.* NB F59:34.
- Nematogonum ferrugineum* (Pers.) Hughes (*Gonatorrhodiella highlei* A.L.Sm.): on *S. sp.* BC [1198].
- Niptera saliceti* (Rehm) Sacc.: on 10 Greenl [900].
- Odontia arguta* (Fr.) Qué.: common on old *S. spp.* Man [93, p. 80].
- O. subabrupta* Bourd. & Galz. and *O. uda* (Fr.) Bres.: on *S. sp.* BC [1198].
- Oligonema nitens* (Lib.) Rost.: on *S. spp.* Man [93, p. 26].
- Ombrophila umbonata* Karst.: on 10 Greenl [900].
- Orbilbia occulta* (Rehm) Sacc.: on *S. sp.* Alaska [175].
- Othia diminuta* Karst.: on *S. sp.* Alaska [175].
- O. winteri* Rehm: on 10 Greenl [900].
- Ozonium auricomum* Pk.: on 1 Alaska [175].
- Patellaria bacilligera* Karst.: on 5 Greenl [899].

- Peniophora cinerea* (Fr.) Cke.: common on dead branches of *S. spp.* Man [93, p. 77].
- P. gracillima* Ell. & Ev. (*P. glebulosa* Bres.): one collection on *S. sp.* Man [93, p. 78]; see *Abies*.
- P. hydroides* Cke. & Masee: on *S. sp.* BC [1198].
- P. longispora* (Pat.) Höhn.: on old *S. spp.* Man [93].
- P. pallidula* (Bres.) Bres.: on *S. sp.* BC [1198]; see *Abies*.
- P. pubera* (Fr.) Sacc.: on old *S. sp.* Man [93].
- P. rimicola* (Karst.) Höhn. & Litsch.: on wood of *S. sp.* Ont [497]; see *Acer*.
- P. rufa* (Fr.) Boid. (*Stereum rufum* Fr.): on *S. sp.* Man, rare [93, p. 79]; see *Populus*.
- P. sambuci* (Pers.) Burt: on *S. sp.* Man [93]; see *Acer*.
- Pestalotia lignicola* Cke.: on 17 Alaska [175].
- P. truncata* Lév.: on 11 Frank [605]; on 17 Alaska [175].
- Pezicula ocellata* (Pers.) Seav. (*Ocellaria o.* (Pers.) Schroet.; stat. conid. *Cryptosporiopsis scutellata* (Oth) Petr.): on *S. sp.* Man [93, p. 42; 979], Ont 43:122.
- Pezizella albella* (With.) Sacc.: on *S. sp.* Greenl [900].
- P. ?viridiflavescens* Rehm. and *P. ?xylita* (Karst.) Rehm: on old ?*S. sp.* Man [93, p. 41].
- Phialea macrospora* Rostr.: on 10 Greenl [900, p. 608].
- P. virgultorum* (Vahl) Sacc.: on 5 Greenl [901]; on 10 Greenl [900].
- P. vulgaris* (Fr.) Rehm: on fallen branches of *S. spp.* Man [93, p. 41].
- Pholiota aurivella* (Batsch ex Fr.) Kummer (*P. adiposa* auct. Am.): on *S. sp.* Alaska [175], BC [1198].
- P. erinaceella* Pk.: on stub of *S. sp.* NS [1138].
- P. spectabilis* (Weinm. ex Fr.) Quél. and *P. squarrosoides* Pk.: on *S. sp.* NS [1138].
- Phoma salicina* West.: on *S. sp.* Alaska [175]; on 5 Greenl [899, 901].
- Phyllosticta apicalis* Davis: on *S. sp.* Que F61:53.
- Physalospora hyalospora* (Ces.) Sacc.: on 10 Greenl [900].
- P. miyabeana* Fukushima [*Glomerella m.* (Fukushi) Arx]: black canker or blight, chancre noire: on *S. spp.* BC [50, 203, 1198], Ont F55:67, Que 52:107, F52:38, NB 31:87, NB NS F58:26, NS 30:84, [419], PEI 51:108, [cf. 1138]; on 2c NS 32:86; almost always associated with *Pollacia saliciperda* (q.v.); opinion differs concerning the relative importance of the two fungi.
- Pleosphaeria mutabilis* Sacc.: on 10 Greenl [900].
- Pleospora cerastii* Oud. (*Pyrenophora c.* (Oud.) Lind): on 4 Greenl [603]; on 44 Alaska [175, 604].
- P. helvetica* Niessl: on *S. sp.*, 4, 18 Frank [52].
- P. herbarum* (Fr.) Rabh.: on dead branches of *S. spp.* Man [93, p. 55].
- P. paucitricha* Fckl. (*Pyrenophora p.* (Fckl.) Berl. & Vogl.): on 4 Greenl [601, 603]; on 5 Greenl [899, 901]; on 18 Yukon [600].
- P. penicillus* (Schm.) Fckl. var. *p.* (*Pyrenophora chrysospora* (Niessl) Sacc.): on 4 Greenl [603]; on 5 Greenl [901]; on 5, 10 Greenl [900].
- P. phaeocomoides* (Berk. & Br.) Wint. (*P. vulgaris* Niessl): on 1 Alaska [175].
- Pleurotus ostreatus* (Jacq. ex Fr.) Kummer: from *S. sp.* Ont [791].
- Pollacia saliciperda* (All. & Tub.) Arx (*Fusicladium saliciperdatum* (All. & Tub.) Tub.): scab, brûlure du saule: on *S. spp.* BC 41:85, [203, 1198], Ont 48:101, F55:67, Que-PEI 29:65, Que F52:38, NB F52:19, Nfld 49:xxi; on 2b Que 56:120; on 2c NS 31:87; on 6 BC Que 61:107, NS 58:109; on 6a Que 52:106, NS PEI 56:120, on 9 Que 54:126; on 14 Que 40:87, NB 37:71; on 15 Que 36:120; on 16 Que 59:85, NB 33:64. From the description of symptoms it is evident that the disease caused by *P. saliciperda* and the associated organism *Physalospora miyabeana* was present in PEI in 1925, 25:68, and the disease attributed to *Dothichiza populea* on *Salix*, NB 23:192, was probably willow blight. By 1929 informative reports of its occurrence were received from Que eastward. The disease spread rapidly and scores of susceptible willows originally brought to the Maritime Provinces by the early French settlers were destroyed. Bordeaux mixture was used successfully to control the disease at Grand Pré Memorial Park, NS 38:93 and later Phygon, 62:107. The only cult. species to prove immune was 2a, NS 52:106, 58:109. Weather conditions that favor apple scab also favor willow blight. Thus blight was severe in NS in 1926-28, in 1936, 1951 and 1960, 39:99, 51:108, 61:107.
- Polyporus adustus* Willd. ex Fr. and *P. albellus* Pk.: on *S. sp.* NS [1138].
- P. arcularis* Batsch. ex Fr.: on dead *S. spp.* Man [93, p. 82]; from *S. sp.* Ont [791].
- P. dichrous* Fr.: on dead *S. spp.* Man [93].
- P. elegans* Bull. ex Fr.: on *S. sp.* BC [1198]; on 1 Alaska [175]; on 1, 20 Alaska [1038].
- P. fumosus* Pers. ex Fr.: recorded on *S. sp.* BC [1198].
- P. gilvus* Schw. ex Fr.: on *S. spp.* Man [93, p. 82].
- P. hirsutus* Wulf. ex Fr.: on *S. sp.* BC [1198], NS [1138].
- P. incarnatus* Fr.: reported on *S. sp.* NS, but the identity of the fungus present is uncertain [1138].
- P. leptcephalus* Fr.: reported on dead *S. sp.* NS [1138].
- P. melanopus* Fr.: at base of *S. sp.* Man [93, p. 83].
- P. montanus* (Quél.) Ferry: on 20 Alaska [1038].
- P. nidulans* Fr. (*P. rutilans* Pers. ex Fr.): on 13 BC [1198].
- P. perennis* L. ex Fr.: on *S. sp.* BC [1198].
- P. picipes* Fr.: on *S. sp.* BC [1198]; reported on *S. sp.* NB [1138].
- P. salignus* Fr.: reported on *S. sp.* NS [1138].
- P. semipileatus* Pk.: on *S. sp.* BC [1198].
- P. squamosus* Mich. ex Fr.: on *S. sp.* Alta F59:92.
- P. tulipiferae* (Schw.) Overh.: on dead branches of *S. sp.* Sask [93, p. 84].
- P. velutinus* Fr.: common on *S. spp.* Man [93].
- P. versicolor* L. ex Fr.: on *S. sp.* BC [1198]; on 1 Alaska [1038].
- Poria eupora* (Karst.) Cke.: on *S. sp.* NS [1138].
- P. ferrea* (Pers.) Bourd. & Galz.: on 13 BC [1198].
- P. ferruginosa* (Schrad. ex Fr.) Karst.: on *S. spp.* Man [93, p. 84], NB [1138]; on 1 Alaska [175].
- P. punctata* (Fr.) Karst.: on old *S. spp.* Man [93], NS [1138]; from *S. sp.* Ont [791].
- P. reticulata* (Pers. ex Fr.) Cke.: on *S. sp.* Alaska [175].
- P. subacida* (Pk.) Sacc.: on 20 BC [1198].
- P. versipora* (Pers.) Rom.: on *S. sp.* BC [1198].
- P. viticola* (Cke.) Cke.: on old *S. spp.* Man [93, p. 85].
- Propolis ?angulosa* Karst.: on 42 Alaska [175, 250].
- Pseudopeziza versicolor* (Wahl. ex Fr.) Rostr.: on 5, 10 Greenl [899].
- Radulum orbiculare* Fr.: on *S. sp.* BC [1198].
- Ramularia rosea* (Fckl.) Sacc.: leaf spot, tache des feuilles: on *S. spp.* Sask 35:63, Man [93, p. 125]; ? on *S. sp.* Que F61:53; on 7a, 22 Alaska [175]; on 28 NS 52:107.
- Rhytisma salicinum* (Pers.) Fr.: tar spot, tache goudronneuse: on *S. spp.* BC [1198], Mack 40:101, Alta

- 32:95, Alta Sask F51:44, Sask Man [93, p. 42], Que 31:88, NB 29:65, NS [1138], PEI 33:64; on *S. sp.*, 4, 19, 20, 23, 40, 42 Alaska [175]; on *S. sp.*, 7a Alaska [555]; on *S. sp.*, 11 Greenl [900]; on 1, 4, 18, 19, 20, 23, 27, 36, 47 Alaska [1038]; on 4, 11, 18, 229, 29a Frank, 5 Mack Labr, 11 Labr [605]; on 4 Frank [971], Greenl [601]; on 4, 10, 11 Greenl [902]; on 5, 10, 11 Greenl [901]; on 5, 10, 11, 33 Greenl [899]; on 8 Que 32:108; on 25 Que 34:109. [8]; on 42 Man [604].
- Rosellinia mammiformis* (Pers.) Sacc.: on *S. sp.* Sask [93, p. 51].
- R. protuberans* Karst.: on 5 Greenl [901]; on 10 Greenl [900].
- R. pulveracea* (Ehrh.) Fckl.: on 5 Greenl [901].
- Schizoxylon insigne* (de Not.) Rehm: on 1 Alaska [175].
- Scutellinia scutellata* (L. ex Fr.) Lambotte (*Lachnea s.* (L. ex Fr.) Gill.): on 10 Greenl [900].
- Septogloeum salicinum* (Pk.) Sacc.: leaf blight, brûlure des feuilles: on *S. sp.* BC Que 48:101; on 20 Alaska [175]; ? on 4 Frank [959].
- Septomyxa salicis* Grove: on *S. sp.* BC F62:121.
- Septoria salicella* Berk. & Curt.: on 5 Greenl [901]; on 10 Greenl [900].
- S. salicicola* (Fr.) Sacc.: on 23 Alaska [175].
- S. salicina* Pk.: on *S. sp.* Que 25:68; ? on *S. sp.* Man [93, p. 139]; on 10 Greenl [899].
- Solenia anomala* (Pers.) Fckl.: on 1 Alaska [175]; on 5 Greenl. [901]; on 10 Greenl. [900].
- S. ochracea* Hoffm. ex Fr.: on *S. sp.* BC [1198]; on 19 BC [1199].
- Sphaerella grossulariae* Auersw. var. *salicella* Sacc. & Scalia: on *S. sp.* Alaska [175].
- Sphaerographium niveum* Dearn. & House: on fallen twigs of *S. spp.* Man [93, p. 140]; the true *S. niveum* occurs only on *Rhamnus*.
- Sphaeronema acrospermum* Tode ex Fr.: on 5 Greenl [901].
- S. foliicola* (Fckl.) Lind: on 4a Frank; apparently the conidial state of *Hypospila groenlandica* (q.v.) [600].
- Steccherinum ochraceum* (Fr.) S.F.Gray: on *S. sp.* Alaska [175].
- Stereum purpureum* (Pers. ex Fr.) Fr.: on *S. sp.* BC [1198]; on *S. sp.*, 6 NS 36:71, [1138].
- S. versiforme* Berk. & Curt.: on *S. spp.* Man [93, p. 79].
- Stictis mollis* Pers.: on 10 Greenl [900, 901].
- S. radiata* L. ex Pers.: on *S. sp.* BC [1198].
- Taeniolella stilbospora* (Cda.) Hughes (*Hormiscium stilbosporum* (Cda.) Sacc., *Septonema atrum* Sacc.): on twigs of *S. sp.* NS [1138]; of 40 Alaska [175, 250].
- Tapesia fusca* (Pers. ex Fr.) Fckl.: on *S. sp.* Alaska [175]; on 5 Greenl [901]; on 20 Alaska [1038].
- Teichospora sp.*: on *S. sp.* Alaska [175, 250].
- T. insecure* (Ell.) Ell. & Ev.: on twigs of *S. sp.* Sask [93, p. 52].
- T. megastega* Ell. & Ev.: on dead branches of *S. spp.* Man [93].
- T. pomiformis* Karst. and *T. pruniformis* (Nyl.) Karst.: on 5 Greenl [901].
- Thelophora caryophylla* Schaeff. ex Fr.: on sand under 20 Alaska [1038].
- Tomentella botryoides* (Schw.) Bourd. & Galz.: on decayed *S. sp.* NS [1138].
- T. coriaria* (Pk.) Bourd. & Galz. (*Hypochnus coriarius* (Pk.) Burt.: on *S. sp.* Man [93, p. 77].
- Topospora proboscidea* Fr. (*Mastomyces p.* (Fr.) Sacc.): on *S. sp.* Alaska [250]; on 5 Greenl [901]; on 35 Sask 38:94.
- Torula antiqua* Cda.: on 5 Greenl [901].
- Trametes hispida* Bagl.: on *S. sp.* BC [1198]; on old wood of *S. sp.* Man [93, p. 85].
- T. odora* (Sommerf. ex Fr.) Fr.: on *S. sp.* BC F60:110.
- T. suaveolens* (L. ex Fr.) Fr.: on *S. sp.* Man [93], NS [1138]; from *S. spp.* Man Ont Que [791]; on 1 Alaska [175].
- Tremella atrovirens* (Fr.) Sacc.: on old sphaeriaceous stromata on *S. sp.* NS [1138].
- T. intumescens* Sm.: on 10 Greenl [900].
- T. lutescens* Pers.: on *S. sp.* Greenl [900].
- Trichopeziza fusca* (Schum.) Sacc.: on 5 Greenl [901].
- Trimmatostroma americanum* Thüm.: on dead twigs of *S. spp.* Man [93, p. 128].
- Tubercularia vulgaris* Tode: on *S. sp.* BC [1199].
- Tulasnella violacea* (Qué.) Bourd. & Galz.: on *S. sp.* BC [1198].
- Tympanis salicina* Groves: on *S. spp.* Que [372, p. 630].
- T. saligna* Nits.: on *S. spp.* Ont [372]; on 10 Greenl [900, 901].
- Typhula candida* Fr.: on 10 Greenl [900].
- Uncinula salicis* (DC. ex Méral) Wint.: powdery mildew, blanc: on *S. spp.* BC [50, 1198], BC Ont Que PEI 25:67, Alta 29:65, Sask Man [93, p. 45], Mack 40:101, Ont 24:53; on *S. sp.*, 1, 20, 23, 33 Alaska [175]; on *S. sp.*, 7a Alaska [555]; on *S. sp.* NS PEI, 8 NS [1138]; on 8 Que 32:108; on 15 NS 52:107; on 28 Que 36:71.
- Uredo mckinleyensis* Cummins: on 18a Alaska [175].
- Valsa ambiens* (Pers. ex Fr.) Fr.: canker, chancre cytosporéen: on branches of *S. spp.* Man [93, p. 57]; on 2c Man 45:105; on 24 Ont 47:102.
- V. boreella* Karst.: on branches of *S. spp.* Man [93, p. 58]; on 1 Alaska [175].
- V. pallida* Ell. & Ev.: on branches of *S. spp.* Man [93].
- V. salicina* (Pers.) Fr.: on *S. sp.* NB F57:25, NS [1138]; on 43 Alaska [175]; ? on *S. spp.* Man [93].
- V. sordida* Nits. (stat. conid. *Cytospora chrysosperma*, q.v.): canker, chancre cytosporéen: on *S. spp.* Alaska [175], NS [1138].
- V. translucens* de Not.: on twigs of *S. spp.* Sask Man [93].
- Valsella salicis* Fckl.: on *S. sp.* Ont F60:67.
- Venturia austro-germanica* Rehm (*V. subcutanea* Dearn., *Mycosphaerella minor* (Karst.) Johans. var. *reticulata* Dearn. [250, p. 7C]): on *S. sp.*, 4 Frank, 18 Alaska [52], [cf. 175, 250]. *V. austro-germanica* is excluded by Nuesch [799] as a *Venturia* on *Salix* because the type host is *Vaccinium myrtillus* not *Salix*; it appears that *V. subcutanea* closely approaches *V. helvetica* Neusch [799, p. 346].
- V. chlorospora* (Ces.) Karst.: on *S. sp.*, 18 Labr, *S. spp.*, 29 Que [52]; on *S. sp.* BC [50], Frank [604]; on *S. spp.* Que [53]; on 4 Frank [903], Greenl [601, 602, 603]; on 5 Greenl [901]; on 10, 11 Greenl [899]; on 11 Que [603]; on 4a, 18 Yukon [600]; according to Barr [52] the Frank records are probably based on specimens of *V. subcutanea*.
- V. ditricha* (Fr.) Karst.: on 11 Frank [605].
- V. macrospora* Rostr.: on 5 Greenl [901, p. 64]. Neusch [799] found only *Mycosphaerella tassiana* on the type specimen, but suggests that *V. helvetica* Nuesch may occur on 5.
- Volutella pulchra* Berk. & Curt.: on 5 Greenl [901].
- Xylographa arctica* Fckl.: on 5 Greenl [899].
- X. parallela* Fr.: on 1 Greenl [900].

Salpiglossis Ruiz & Pav. SOLANACEAE

Annual, biennial or perennial herbs native to China; one grown in the flower garden.

1. *S. sinuata* Ruiz & Pav., painted tongue, salpiglosse; several cultivars.

Fusarium spp.: foot rot, pourridié fusarien: isolated from affected plants of 1 were *F. oxysporum* Schlecht., Man 39:108, [335]; *F. acuminatum* Ell. & Ev., *F. solani* (Mart.) App. & Wr., Man 41:98, [335].

Virus: mosaic, mosaïque: on *S. sp.* BC 31:100.

Salvia L. LABIATAE

Annual, biennial or perennial herbs, subshrubs and shrubs widely distributed in the temperate and warm regions of the world; a few grown for culinary or medicinal purposes.

1. *S. officinalis* L., sage, sauge; Mediterranean region; escaped in Que and Ont.
2. *S. splendens* Sello; Brazil; numerous cultivars.

Fungi from seed: of 1: *Alternaria tenuis* auct. sensu Wiltshire, *Botrytis cinerea* Pers., *Cladosporium cladosporioides* (Fres.) De Vries, *Stemphylium botryosum* Wallr., BC [374].

Fusarium oxysporum Schlecht.: wilt, flétrissure fusarienne: on *S. sp.* Que 59:90; isolated from 2 Ont 52:120, [335].

Meloidogyne hapla Chitwood: root knot, nodosité des racines: on *S. sp.* Ont 61:116.

Tomato spotted wilt virus: spotted wilt, tache de bronze: on *S. spp.* Que 44:116.

Sambucus L. CAPRIFOLIACEAE

Shrubby, arborescent or even herbaceous plants, mostly of the northern hemisphere.

1. *S. callicarpa* Greene; Ore and Calif.
2. *S. canadensis* L. (including *S. c.* var. *laciniata* Gray), common elder, sureau blanc; NS to Man.
3. *S. glauca* Nutt.; Alta and BC to Calif and NM.
4. *S. nigra* L., elder, sureau noir; Europe; occasionally spread from cult. 4a, *S. n.* var. *aurea* Sweet.
5. *S. pubens* Michx. (*S. racemosa* L. ssp. *p.* (Michx.) Hult.), catberry, sureau rouge; Labr and Nfld to Man, Alaska and Calif.
6. *S. racemosa* L.; Europe and w. China.

Ascochyta sambuci Sacc.: on 4a Alaska [175].

A. wisconsinensis Davis: leaf spot, tache ascochytiq: on 2 NS 52:107, 54:126.

Botrytis cinerea Pers.: on *S. sp.* Alaska [175].

Camarosporium sp.: on twigs of *S. sp.* Sask [93, p. 132].

Coniothyrium fuscidulum Sacc.: on 1 Alaska [175].

C. olivaceum Bon.: on 5 Alaska [175].

Cryptodiaporthe calosphaerioides (Ell. & Ev.) Wehm.: on 5 Alaska [175].

Cytospora pulcherrima Dearn. & Hansbr.: on 3 BC [253].

C. ?sambuci Died.: on 2 Sask 31:124.

Dendropleella hirta (Fr.) Munk: on 5 Que [53].

Diaporthe sociabilis Nits. var. *sambuci* (Ell. & Ev.) Wehm.: on *S. sp.* Alaska [175].

Fenestella vestita (Fr.) Sacc.: on *S. sp.* Ont F62:70.

Fusarium spp.: crown rot, pourridié fusarien: on ? Sask, 6 Man 45:105. Isolated from wood or dying twigs of 6 were: *F. acuminatum* Ell. & Ev., Sask Man; *F. avenaceum* (Fr.) Sacc., *F. equiseti* (Cda.) Sacc., *F. poae* (Pk.) Wr., Sask; *F. solani* (Mart.) App. & Wr., Man; *F. sporotrichioides* Sherb., Sask [335].

Helotium virgultorum (Vahl ex Fr.) Fr.: on *S. sp.* Alaska [176]; on 5 Alaska [1038].

Hymenochaete tabacina (Sow. ex Fr.) Lév.: on *S. sp.* BC [1198].

Leptosphaeria dumetorum Niessl: on 5 NS [1138].

L. sambucina Ell. & Ev.: on *S. sp.* Sask 31:82.

Melanomma sambuci Earle: on *S. sp.* Alaska [175].

Microsphaera grossulariae Wallr. ex Lév.: on 2 Que 31:124, NS [1138].

M. penicillata (Wallr. ex Fr.) Lév. (*M. alni* (Wallr.) Salm.): on 2 Que 32:108; but see above.

Mollisia ligni (Desm.) Karst.: on *S. sp.* Alaska [175].

Nectria cinnabarina Tode ex Fr.: on 1, 5 Alaska [175].

Odontia crustosa (Pers.) Quél.: on 5 NS [1138]; see *Acer*.

Peniophora incarnata (Pers. ex Fr.) Karst.: on *S. sp.* BC [1198].

P. sambuci (Pers.) Burt: on *S. sp.* NS [1138]; on 1 BC [1198]; see *Acer*.

Phoma ?sambucina Sacc.: on twigs of *S. sp.* Sask 34:109, [93, p. 134].

Polyporus elegans Bull. ex Fr.: on 5 Alaska [175].

Poria versipora (Pers.) Rom.: on 1 BC [1198].

Puccinia bolleyana Sacc.: 0 I on *S. sp.* Ont F60:66; on *S. sp.*, 2, 4 Ont [828]; on 2 NS [1138], [cf. 15, p. 204].

Ramularia sambucina Sacc.: on 6 Que F61:53.

Rosellinia ligniaria (Grev.) Nits.: on 5 Alaska [175].

Sclerotium sp.: on 5 Alaska [175].

Septoria sambucina Pk.: leaf spot, tache septorienne: on *S. sp.* Alaska [175], Alta F58:82; on 2 PEI 53:111; on 6 BC 43:115, [535], Man 43:115, 45:105, [93, p. 139].

Stigmina pedunculata (Ell. & Ev.) M.B.Ellis (*Coryneum pedunculatum* Ell. & Ev.): on twigs of 3 BC [481].

Triposporium elegans Cda.: on 5 Alaska [175].

Tubercularia sambuci Cke.: on 5 Alaska [175].

Sanguisorba L. ROSACEAE

Annual or perennial herbs of the northern hemisphere.

1. *S. canadensis* L., cariboo feed, herbe à pisser; Labr, Nfld and NS.
2. *S. microcephala* Presl; Alaska to n. Calif.
3. *S. officinalis* L.; Alaska, Yukon and Eurasia.

4. *S. sitchensis* C.A.Mey.; Alaska, Yukon to Idaho and Ore.

Gloeosporium sanguisorbae Fckl. [*Discula s.* (Fckl.) Arx, 15a, p. 36]: on 1 Que 32:108.

Isariopsis bulbiger (Fckl.) Savile (*Ovularia b.* (Fckl.) Sacc.): on 2 NS [956, p. 201]; on 4 Alaska [175].

Leptotrochila sanguisorbae (Jaap) Schüepp [973, p. 261] (*Fabraea s.* Jaap): on S. sp. Alaska [175].

Marssonina sennensis Gonz. Frag.: on 2 Alaska [1038]; on 3 Alaska [983]; on 4 BC [956].

Sphaerotheca macularis (Wallr. ex Fr.) Magn. (*S. humuli* (DC.) Burr.): on 1 NS [1138]; on 3 Alaska [175].

Xenodochus carbonarius Schlecht.: I III on 2 or 3 Alaska [15, p. 92; 175].

X. minor Arth.: III on 4 Alaska [15, p. 92; 175].

Sanicula L. UMBELLIFERAE

Perennial or biennial herbs of N. and S. America, Eurasia and Africa.

1. *S. crassicaulis* Poepp.; BC to Calif and also in S. America.
2. *S. marilandica* L., black snakeroot; Nfld and NS to BC.

Mycosphaerella tassiana (de Not.) Johans.: on 1 BC [50].

Physoderma pluriannulatum (Berk. & Curt.) Karling (*Urophlyctis pluriannulata* (Berk. & Curt.) Farl.): on 2 Man [93, p. 29].

Pleospora herbarum (Fr.) Rabh. var. *h.* (*P. armeriae* (Cda.) Ces. & de Not.): on 1 BC [50].

Puccinia marylandica Lindr.: 0 I II III on 2 Alta Sask Man [15, p. 315], Sask Man [93, p. 69], Sask 30:99, Ont Que [828], Que 33:122; on S. sp. NS [15; cf. 1138].

Sanseveria Thunb. AGAVACEAE

Stiff-leaved plants of Africa and Asia; grown as pot plants for house decoration.

Gloeosporium sanseveriae Verwoerd & de Plessis: leaf spot, anthracnose: on newly imported plants of *S.* sp. BC [535]; also elsewhere in Canada.

Saponaria L. CARYOPHYLLACEAE

Coarse annual or perennial herbs of the Old World.

1. *S. officinalis* L., bouncing bet or soapwort, herbe à savon; introduced into cult. from Europe and now naturalized in s. Que and s. Ont.
2. *S. vaccaria* L., cow cockle, blé de vache; Eurasia; a common weed in the Prairie Provinces but unknown in Nfld and PEI.

Alternaria saponariae (Pk.) Neerg. (*Macrosporium s.* Pk.): on leaves of 2 Man [93, p. 121].

Cylindrosporium ?officinale Ell. & Ev.: leaf spot, tache cylindrosporienne: on 1 Man 34:80, [93, p. 130].

Phyllosticta ?dianthi West.: leaf spot, tache phyllostictéenne: on 1 Man 43:116.

Sarcobatus Nees CHENOPODIACEAE

Shrubs of w. N. America.

1. *S. vermiculatus* (Hook.) Torr., greasewood; Alta and Sask to Calif and NM.

Puccinia aristidae Tracy: 0 I on 1 Sask [93, p. 66; cf. 15, p. 157].

Sarracenia L. SARRACENIACEAE

Perennial plants of e. N. America.

1. *S. purpurea* L., pitcher plant, petits cochons; in Canada from Labr, Nfld and NS to Man, Sask and Mack.

Glomerella cingulata (Stonem.) Spauld. & Schrenk.: on 1 Que [53].

Mycosphaerella sarraceniae (Schw.) House: on 1 NS [1138]; ? on 1 Man [93, p. 53].

Satureja L. LABIATAE

Aromatic herbs or subshrubs of warm or temperate regions of both hemispheres.

1. *S. arkansana* (Nutt.) Briq.; in Canada in Ont.
2. *S. douglasii* (Benth.) Briq. (*Micromeria d.* (Benth.) Benth.), good herbs; BC to Calif.
3. *S. hortensis* L., summer savory, sarriette; Europe; escaped from cult.
4. *S. vulgaris* (L.) Fritsch (*Clinopodium vulgare* L.), wild basil, grand basilic sauvage; native to Eurasia, represented in Canada by 4a, *S. v.* var. *neogaea* Fern., from Nfld and NS to Man.

Fungi from seed: of 3: *Alternaria consortialis* (Thüm.) Groves & Skolko, *A. tenuis* auct. sensu Wiltshire, *Aureobasidium pullulans* (de Bary) Arn., *Botrytis cinerea* Pers., *Cladosporium cladosporioides* (Fres.) De Vries, *C. herbarum* Fr., *Epicoccum nigrum* Lk., BC [374].

Puccinia menthae Pers.: 0 I II III on 1, 4 Ont [828]; on 2 BC [1198]; on 4 Ont [15, p. 328].

Saussurea DC. COMPOSITAE

Annual or perennial herbs mainly of the northern hemisphere.

1. *S. angustifolia* (Willd.) DC.; Keew, Yukon, Alaska and e. Asia.

Pleospora phaeocomoides (Berk. & Br.) Wint. (*P. vulgare* Niessl): on 1 Yukon [250].

Saxifraga L.

SAXIFRAGACEAE

Mainly perennial herbs of N. and S. America and Eurasia; a few cult. for ornament.

1. *S. aizoides* L.; Nfld and Que to arctic Canada, Alta and BC.
2. *S. aizoon* Jacq.; Europe and Asia Minor; in N. America as 2a, *S. a.* var. *neogea* Butters; Greenl, arctic Canada and also Nfld, NS, NB and Sask.
3. *S. arguta* D.Don; BC to Mont, Calif and NM.
4. *S. bracteata* D.Don; Alaska and e. Asia.
5. *S. bronchialis* L.; Yukon, Alaska and Asia.
6. *S. caespitosa* L. (including *S. groenlandica* L. and *S. g.* var. *uniflora* R.Br.); Greenl, Nfld and Que to Alaska, Ore and Colo; also in Eurasia.
7. *S. cernua* L.; Nfld and Que to arctic Canada and Colo; also in Eurasia.
8. *S. cotyledon* L.; mts. of Europe.
9. *S. ferruginea* Graham; Alaska and BC to Idaho and Calif.
10. *S. flagellaris* Willd., spider plant; circumpolar, especially in the high arctic. 10a, *S. f.* var. *platysepalata* Trautv.; Greenl, arctic Canada and Alaska; also Eurasia.
11. *S. hieracifolia* Waldst. & Kit.; interrupted circumpolar distribution.
12. *S. hirculus* L.; circumpolar. 12a, *S. h.* var. *propinqua* (R.Br.) Simm.
13. *S. lingulata* Bell. var. *lantoscana* Boiss. & Reut.) Rouy & Camus; s. Europe.
14. *S. lyallii* Engler; Alaska to Idaho and Mont.
15. *S. mertensiana* Bong.; Alaska to Calif.
16. *S. nivalis* L.; circumpolar.
17. *S. nudicaulis* D.Don; Yukon, Alaska and e. Asia.
18. *S. occidentalis* Wats. ssp. *rufidula* (Small) Bacigalupi; BC to Ore.
19. *S. oppositifolia* L., mayflower; Nfld and Que to arctic Canada, Alaska, Wyo, Wash and Ore; also in Eurasia.
20. *S. punctata* L.; w. arctic Canada, Alaska and e. Asia. 20a, *S. p.* ssp. *nelsoniana* (D.Don) Hult. (*S. n.* D. Don).
21. *S. rivularis* L.; Nfld to arctic N. America and Eurasia.
22. *S. stellaris* L., kidney wort; Labr and Greenl.
23. *S. tolmei* Torr. & Gray; Alaska to Wash, Ore and Calif.
24. *S. tricuspidata* Rottb.; Greenl, Labr to Ont, Man, arctic Canada and BC.

25. *S. virginensis* Michx., sweet wilson; in Canada from NB and Que to Ont.

Other hosts: 26, *S. foliolosa* R.Br. (*S. stellaris* L. var. *comosa* Poir.). 27, *S. parviflora* Greene. 28, *S. tenuis* (Wahl.) Smith.

Arcticomycetes warmingii (Rostr.) Savile (*Exobasidium* w. Rostr.): on 1 Keew [962]; on 2 Greenl [899]; on 2a Greenl [954, p. 984]; on 19 Frank Keew [959]. Frank [961, 962, 971], Greenl [900, 902].

Botrytis cinerea Pers.: on 21 Alaska [175].

Cercospora saxifragae Rostr.: on 21 Keew [959]; stat. conid. of *Mycosphaerella saxifragae* (q.v.) [971].

Cladosporium herbarum (Pers.) Lk.: on 7, 19 Greenl [901]; on 16 Greenl [602]; on 24 Greenl [899].

Coniothyrium saxifragae Rostr.: on 24 Frank [903, p. 8].

Didymella inconspicua Johans.: on 19 Frank [604].

Fabraea sp.: on 12 Frank [959].

Herpotrichiella setosa Barr: on basal leaves and stalks of 19 Frank Que [52, p. 30].

Laestadia saxifragae Sacc. & Scalia: on 27 Alaska [175].

Leptosphaeria brachyasca Rostr.: on 6 Greenl [602]; on 19 Greenl [900, p. 618].

L. hyperborea (Fckl.) Berl. & Vogl.: on 19 Frank [52].

Melampsora arctica Rostr.: 0 I on 4 Alaska [15, p. 56, 175]; on 19 Greenl [15, 602].

M. epitea Thüm.: 0 I on 6, 19 Frank [959]; on 19 Frank [971].

M. vernalis Niessl: 0 I on 7 Que [605].

Mycosphaerella densa (Rostr.) Lind: on 12 Mack Frank, 21 Alaska [604].

M. minor (Karst.) Johans. (*Sphaerella minor* Karst.): on 2, 19 Greenl [899]; on 6 Frank, 19 Frank Que, 24 Frank [52]; on 20a Alaska [250]; on 21 Alaska [604].

M. saxifragae (Pass.) Lind (*Dothidella sphaerelloides* Dearn., *M. densa* auct.; stat. conid. *Cercospora saxifragae*, q.v.): on 12 Alaska [175], Alaska Mack [250]; ascigerous state on 12a, 26, conidial state on 16 Frank, also known from Canadian arctic on 7, 12, 16, 21, 26 [971]; on 16 Frank [52].

M. tassiana (de Not.) Johans. (*M. pachyasca* (Rostr.) Vestergr., *Sphaerella p.* Rostr.): on 7 Greenl [899]; on 7, 12a, 21 Frank [600]; on 7, 22 Greenl [901]; on 10 Greenl [602]; on 12 Frank [903]; on 12 Frank, 21 Labr [604]; on 12a Yukon [600]; on 22 Greenl [603].

M. tassiana var. *arctica* (Rostr.) Barr: on 6, 21 Frank, 7 Frank Que [52].

M. tassiana var. *tassiana*: on 6 Que [52].

Phoma alpina Speg.: on 6 Frank [903].

P. saxifragarum West.: on 16 Greenl [899].

Platyspora pentamera (Karst.) Wehm. (*Clathrospora p.* (Karst.) Berl., *C. platyspora* (Sacc.) Berl.): on 7 Greenl [602]; on 24 Man [604].

Pleospora ambigua (Berl. & Bres.) Wehm.: on 7, 19 Frank [52].

P. androsaces Fckl. (*Pyrenophora a.* (Fckl.) Sacc.): on 16 Frank [604].

P. cerastii Oud. (*Pyrenophora c.* (Oud.) Lind): on 1 Frank Man, 12, 24 Frank [604]; on 19 Greenl [603].

P. comata Auersw. & Niessl (*Pyrenophora c.* (Niessl) Sacc.): on 2 Greenl [901]; on 7, 12 Frank [604].

P. coronata Niessl (*Pyrenophora c.* (Niessl) Sacc.): on 6 Greenl [603].

P. helvetica Niessl: on 6, 7, 10a, 19, 24 Frank [52].

P. herbarum (Fr.) Rabh.: on 1, 6, 7, 12, 16 Frank

[903]; on 2, 6 Greenl [900]; on 6 ?Alta [604]; on 7 Greenl [603]; on 11 Greenl [902]; on 16 Greenl [602].

Pleospora mendax (de Not.) Sacc.: on 6 Frank [604].

P. penicillus (Schm.) Fckl. var. *p.* (*Pyrenophora chryospora* (Niessl) Sacc.): on 6 Greenl [603]; on 6, 16 Greenl [899]; on 6, 22 Greenl [602]; on 6 Frank, 24 Man [604]; on 21 Greenl [900]; on 26 Frank [600].

P. phaeocomoides (Berk. & Br.) Wint. var. *infectoria* (Fckl.) Wehm. (*P. i.* Fckl.): on 6, 7 Greenl [602]; on 7, 10, 16, 19 Greenl [603].

P. phaeospora (Duby) Ces. & de Not.: on 24 Frank [52].

P. scrophulariae (Desm.) Höhn.: on 1, 12 Frank [604]; on 16 Frank [52].

P. scrophulariae var. *compositarum* (Earle) Wehm. (*P. media* Niessl): on 16 Greenl [602].

P. tragacanthae Rabh.: on 24 Frank [52].

Pseudomassaria inconspicua (Johans.) Barr: on 10 Frank, 24 Frank Que [52].

Pseudopeziza axillaris Rostr.: on 22 Greenl [900, p. 612].

Puccinia fischeri Cruchet & Mayor: III on 19 Yukon [954], Keew Frank [959], Frank [961, 962, 971].

P. heucherae (Schw.) Diet. sensu lat. (*P. curtipes* Howe): III on *S. sp.* BC, 25 Que 34:109; on 3 BC [1198].

P. heucherae var. *austroberingiana* Savile: on 14 Alaska, 20 Alaska Yukon [954, p. 407]; on 14, 20a Alaska [175].

P. heucherae var. *heucherae*: on 14 BC Alta [954].

P. heucherae var. *saxifragae* (Schlecht.) Savile: on 7 Frank Mack Keew Que Greenl, 11 Frank Keew, 16 Frank Keew Greenl, 18 BC, 21 Alaska BC Frank Que, 25 Que, 26 Frank [954, p. 408; cf. 1030]; on 7, 16 Frank [959]; on 7, 16, 28 Frank [971]; on 7 Greenl, 21 BC [15, p. 293]; on 11 Frank [962]; on 16 Frank [961], [cf. 828].

P. laurentiana Trel.: III on 17 St. Lawrence I., Bering Sea, Alaska; known only from the type locality [15, p. 240; 175; 954].

P. pazschkei Diet.: III on 8, 13 in greenhouse Ont [828].

P. pazschkei var. *heterisiae* (Jacks.) Savile: on 15 BC [954, p. 410].

P. pazschkei var. *jueliana* (Diet.) Savile: on 1 Frank Greenl, 9 BC [954, p. 411].

P. pazschkei var. *oppositifoliae* Savile: on 19 Que type [954, p. 413].

P. pazschkei var. *tricuspidatae* Savile: on 5 BC, 24 Alaska Yukon Mack Frank Keew Greenl [954, p. 410]; on 24 Alaska [175], Frank [971; cf. 959]; on 24 Frank [962].

P. saxifragae Schlecht. sensu lat. (*Micropuccinia s.* (Schlecht.) Rostr.): III on 7 Greenl [603]; on 7, 21 Greenl [902, p. 114]; on 16 Greenl [901]; on 24 Greenl [899]. The rust on 16 Greenl [901] is *P. heucherae* var. *saxifragae* [971].

Pyrenopeziza svalbardensis Lind: on 12a Frank [971].

Ramularia ?saxifragae Syd.: on 6 Frank, but see *Mycosphaerella saxifragae* [971].

Rhabdospora pleosporoides Sacc.: on 19 Cape Shudlup, Hudson Strait [604].

Sphaerotheca macularis (Wallr. ex Fr.) Lind: on 20a Alaska [175].

Synchytrium groenlandicum Allesch.: on 7 Keew [604]; delete, fide [539].

S. rubrocinctum Magn.: on 7 Keew, 21 Frank [541; 959]; on 1 Keew, 7, 10a, 19 Frank [971].

Urocystis heucherae Garrett: on 23 BC [957].

Venturia fimbriata Dearn. & House: on 6 Frank [52].

Scabiosa L.

DIPSACACEAE

Annual or perennial herbs of Europe, Asia and Africa; a few are popular flower garden plants.

1. *S. atropurpurea* L.; s. Europe; its cultivars are among the most popular flower garden annuals.

Aster yellows virus: aster yellows, jaunisse de l'aster: on *S. sp.* Que 31:90, NB 32:88, 37:85, 49:110.

Scilla L.

LILIACEAE

Low bulbous plants of the temperate regions of the Old World.

1. *S. hispanica* Mill.; Eurasia; source of many cultivars; escaped in e. US.

Uromyces muscari (Duby) Lév. f. sp. *scillae* (Lehovsky) Savile: on 1 BC [963, p. 46].

Schedonnardus Steud.

GRAMINEAE

A low annual grass.

1. *S. paniculatus* (Nutt.) Trel., tumble grass; in Canada in Man to Alta; also in S. America.

Claviceps purpurea (Fr.) Tul.: isolates of rye ergot used to infect 1 experimentally Alta [172].

Schizachne Hack.

GRAMINEAE

Perennial grasses of N. America and e. Asia.

1. *S. purpurascens* (Torr.) Swallen; Nfld to s. Alaska.

Mycosphaerella tassiana (de Not.) Johans.: on 1 BC [50].

Schizanthus Ruiz & Pav.

SOLANACEAE

Annuals or biennials, native to Chile; grown for the profusion of showy blooms.

Aster yellows virus: aster yellows, jaunisse de l'aster: on *S. sp.* NB 32:88, 36:73, PEI 43:116, 44:106.

Scindapsus Schott

ARACEAE

Climbing plants of Malaysia; grown in the warmhouse for their spotted foliage.

1. *S. aureus* Engler; Solomon Islands.

Meloidogyne sp.: root knot, nodosité des racines: associated with a destructive root rot of 1 Ont 43:123.

Scirpus L

CYPERACEAE

The bulrushes have a worldwide distribution.

1. *S. acutus* Muhl.; Nfld and NS to BC.
2. *S. americanus* Pers., three-square; Nfld to Que and Ont.
3. *S. atrocinctus* Fern.; Nfld, NS and Que to Man and Sask.
4. *S. atrovirens* Muhl.; Nfld, NS and Que to Sask.
5. *S. caespitosus* L. and *S. c.* var. *callosus* Bigel (*Trichophorum c.* (L.) Hartm., *T. c.* spp. *austriacum* (Palla) Hegi), deer grass; Nfld and NS to arctic Canada and Alaska; also in Eurasia.
6. *S. cyperinus* (L.) Kunth and *S. c.* var. *pelius* Fern.; Nfld and NS.
7. *S. fluviatilis* (Torr.) Gray; NB to Sask.
8. *S. paludosus* Nels., bayonet grass, triangle; in Canada from Man to BC. 8a, *S. p.* var. *atlanticus* Fern.; Que.
9. *S. pedicellatus* Fern., wool grass; Nfld to Ont.
10. *S. rubrotinctus* Fern. (*S. microcarpus* auct. non Presl); Labr, Nfld and NS to Sask.
11. *S. validus* Vahl, bulrush, grand jonc; tropical America, represented by *S. v.* var. *creber* Fern.; Nfld and NS to Alaska.

Anthracoidea scirpi (Kühn) Kukkonen [572, p. 69] (*Cintractia s.* (Kühn) Schellenb., *Ustilago caricis* auct.): on 5 Greenl [899], Que [292].

Hypoderma scirpinum DC.: on 11 Sask 31:124, [93, p. 43].

Leptosphaeria juncicola Rehm: on 5 Alaska [175].

Puccinia angustata Pk.: II III on *S. sp.*, 3, 6, 9, 10 Ont [828]; on *S. sp.*, 6, 9, 10 NS [1138]; on 4 Man, 6 Ont, 10 Sask Man [93, p. 65]; on 4 Ont Que, 6 Ont Que NS, 10 Man [15, p. 195].

P. mcclatchieana Diet. & Holw.: II III on 10 BC NS [15, p. 191], [cf. 1138].

P. obtecta Pk.: II III on 11 Sask [93, p. 70], Sask Ont [15, p. 189]; on *S. sp.*, 1, 2, 6, 10 Ont [828].

Septoria pnarvisiana Sacc.: on ?11 Man [93, p. 139].

Sphaerella scirpi Auersw. ex Rostr.: on 5 Greenl [899].

Uromyces americanus Speg.: II III on 10 Ont [828], Ont NS (as *U. scirpi*) [15, p. 192], [cf. 1138].

U. lineolatus (Desm.) Schroet. (*U. scirpi* (Cast.) Burr.): II III on 7 Ont [828], Que [15]; on 8 Sask NS [15, p. 192], Sask 32:108, [93, p. 73], [cf. 1138].

Scolochloa Lk.

GRAMINEAE

Tall perennial grasses of the temperate region of the northern hemisphere.

1. *S. festucaeae* (Willd.) Lk. (*Fluminia f.* (Willd.) Hitchc.), sprangle top; Man to Mack and BC; also in Eurasia.

Claviceps purpurea (Fr.) Tul.: ergot, ergot: on 1 Man 23:38, 24:82, but omitted in [93, p. 45].

Puccinia coronata Cda.: crown rust, rouille couronnée: on 1 Sask [93, p. 67], Sask Man [15, p. 153].

P. coronata "var. *calamagrostis*" Fraser & Ledingham: on 1 Sask [312].

Scrophularia L.

SCROPHULARIACEAE

Coarse perennial herbs of temperate regions.

1. *S. lanceolata* Pursh (*S. leporella* Bickn.), herbe du siège; in Canada in NS and from Que to BC.

Septoria scrophulariae Pk.: on 1 Que 32:108.

Scutellaria L.

LABIATAE

Perennial herbs occurring in all but the colder regions of the world.

1. *S. lateriflora* L., mad-dog skullcap; in Canada from Nfld and Que to n. Ont, Man and BC.

Erysiphe cichoracearum DC. ex Mérat: on 1 Que 31:124, NS [1138].

E. ?galeopsidis DC. ex Mérat: on 1 Man [93, p. 44].

E. polygoni DC. ex Mérat: on 1 NS [1138]; probably all these records are referable to *E. galeopsidis*.

Septoria scutellariae Thüm.: on 1 Ont [93, p. 139].

Secale L.

GRAMINEAE

Grasses of Eurasia; one cult. for grain and forage.

1. *S. cereale* L., rye, seigle; cultigen supposedly developed from *S. montanum*; cult. widely and escaped to some extent.
2. *S. montanum* Guss.; introduced from s.w. Asia and escaped in Wash.

Bipolaris sorokiniana (Sacc. in Sorok.) Shoem. (*Helminthosporium sativum* Pamm., King & Bakke): spot blotch, tache foliaire: on 1 Man 35:14, [93, p. 120], NS 52:13.

B. sorokiniana and *Fusarium* spp.: common root rot, piétin commun: on 1 Alta Man 28:25, Sask 30:27, 31:22, [cf. 1034]. The disease is common in the Prairie Provinces, but fields of 1 are only rarely severely damaged.

Cladosporium herbarum Pers.: caused a black mold on heads of 1 Ont 56:12.

Claviceps purpurea (Fr.) Tul.: ergot, ergot: on 1 BC-NS 24:14, BC [50, 535], BC-Ont [172], Sask Man [93, p. 45], Que [8], NB PEI [1138], PEI 36:13; on 1, general in Canada, and on 1 × 2 BC [1034].

Rye is the most susceptible of the four cereals wheat, oats, barley and rye. Because concern was felt over the amount of ergot in cereal grains, particularly wheat in 1952, surveys were conducted for the next 3 years, 53:23, 54:30, 55:29, to determine its prevalence in fields of cereals in Alta

Sask and Man. These surveys showed that rye is the most heavily infected cereal, 53:26. Also the presence of rye, as a volunteer or as an impurity in the seed, accounted for an appreciable amount of the ergot present in other cereal crops. Ergot-infested grasses in the headlands increased the level of infection around the margins of the fields. The amount of ergot fluctuated greatly from year to year. In the 1942-43 crop year, 15.3% of the rye crop inspected from the Prairie Provinces was graded ergoty, whereas in 1952-53 the amount was 10% and in 1937-38 less than 0.1%, 53:27.

Colletotrichum graminicola (Ces.) G.W.Wilson: anthracnose, anthracnose: destructive to seedlings of *I* Ont 50:15.

Curvularia geniculata (Tracy & Earle) Boed. (*Helminthosporium geniculatum* Tracy & Earle): from crowns and roots of *I* Man [93, p. 120].

Drechslera tritici-repentis (Died.) Shoem. (*Helminthosporium t.-r.* (Died.) Died.): leaf blotch, tache des feuilles: on *I* Alta 57:25, [1993].

D. tuberosa (Atk.) Shoem. (*Helminthosporium tuberosum* Atk.; stat. perf. *Pyrenophora japonica* Ito & Kurib.): leaf spot, tache des feuilles: on *I* Alta 57:25.

Erysiphe graminis DC. ex Méral: powdery mildew, blanc: on *I* BC 39:23, [50, 535], Alta Sask Man Que 24:14, Sask Man [93, p. 44], Ont 32:22, NB 60:97, NS 40:17, [1138], PEI 50:15, [cf. 1034]; on *2* Que 42:16; infection sporadically heavy.

Fungi from seed: of *I*: *Alternaria tenuis* auct. sensu Wiltshire, Sask; *Epicoccum nigrum* Lk., Ont [374]. *Fusarium acuminatum* Ell. & Ev., Man; *F. avenaceum* (Fr.) Sacc., Que; *F. poae* (Pk.) Wr., Man [334]. *Nigrospora sphaerica* (Sacc.) Mason, Ont; *Stemphylium botryosum* Wallr., Sask [374].

Fusarium spp.: head blight, brûlure de l'épi: on *I* PEI 42:16; isolated from blighted heads, *F. avenaceum*, NB; *F. graminearum* Schwabe, Que; *F. poae*, Man [335].

Fusarium spp.: from basal parts of diseased plants of *I*: *F. acuminatum*, *F. avenaceum*, *F. oxysporum* Schlecht., *F. o.* var. *redolens* (Wr.) Gordon, Man [335].

Lagenia radiculicola Vanterpool & Ledingham: on *I* Sask [93, p. 29, 1114], Sask Ont [1034].

Olpidium brassicae (Wor.) Dang. (*Asterocystis radialis* de Wild., *Olpidiaster r.* (de Wild.) Pascher): rootlet necrosis, nécrose des racines: on *I* Sask 29:11, [93, p. 29; 1034].

Ophiobolus graminis Sacc. (*O. careceti* (Berk. & Br.) Sacc.): take-all, piétin-échaudage: on *I* Alta 49:12, Sask 25:15, [cf. 905, 906].

Polymyxa graminis Ledingham: experimentally on *I* Ont 32:98, [595, 1034].

Pseudomonas atrofaciens (McCull.) F.L.Stev.: bacterial leaf spot, tache bactérienne: on *I* Man 39:23.

Puccinia coronata Cda. f. sp. *secalis* Peturson: crown rust, rouille couronnée: reaction was variable on cultivars of *I*, some plants being resistant and others highly susceptible [845]. This rust has not been detected in the field, although near concentrations of *Rhamnus cathartica*, as in some localities of Ont, it should be present.

P. graminis Pers.: stem rust, rouille de la tige: II III on *I* BC [535], Alta-Ont 20:7, Sask Man [93, p. 68], Ont [15, p. 173], Que 24:14, NB NS 37:13, [1138], PEI 42:16. Rye was heavily infected by overwintering urediniospores from *Agropyron repens* Man 51:11. In N. America stem rust of rye has regularly proved to be *P. graminis* f. sp. *secalis* Erikss. & Henn.

P. recondita Rob. ex Desm. (*P. dispersa* Erikss. & Henn., *P. rubigo-vera* Wint., *P. secalina* Grove): leaf rust, rouille des feuilles: on *I* BC 43:14, [535], Alta-Que 24:14, Sask Man [93, p. 71], NB 37:13, NS PEI 36:13, [1138], Nfld 61:48, s. Canada [15, p. 181]; on *2* Que 42:16. Although the rust is common, only rarely is the infection heavy.

Pythium spp.: browning root rot, piétin brun: on *I* Sask 29:10, 30:27.

P. graminicola Subram. (*P. arrhenomanes* Drechsl.): on *I* Sask [93, p. 31; 1034].

P. volutum Vanterpool & Truscott: on *I* Sask [93].

Rhynchosporium secalis (Oud.) Davis: scald, tache pâle: on *I* BC 43:14, [535], Alta 35:14, Alta Sask [1034], NB 60:97.

Sclerotinia borealis Bubák & Vleugel: on *I* Alaska [592].

Septoria secalis Prill. & Del.: speckled leaf spot, tache septoriennne: on *I* Alta 35:14, Sask 39:23, Sask Man [93, p. 139], Que 42:16, [cf. 1034]; frequently observed in central and n. Alta, and occasionally the infection is moderate.

Urocystis occulta (Wallr.) Rabh.: stem smut, charbon de la tige: on *I* Alta Man Ont 24:14, Sask 26:7, 34:17, Que 52:13, [cf. 292]. Although the smut is rare, a noticeable outbreak may occur occasionally Sask 30:25, Que 52:13.

Ustilago nuda (Jens.) Rostr.: reported on *I* Alaska [1037].

Xanthomonas translucens (Jones, Johnson & Reddy) Dowson ff. spp. (*Pseudomonas t.* Jones, Johnson & Reddy): bacterial blight: on *I* Alta 31:22, Sask 30:27, Man 34:17. Before 1942, *X. translucens* f. sp. *secalis* (Reddy, Godkin & Johnson) Hagborg and f. sp. *undulosa* (Sm., Jones & Reddy) Hagborg were found to occur naturally on *I* in Man and f. sp. *cerealis* Hagborg produced infection after wound inoculation of *I* seedlings [396], but apparently f. sp. *cerealis* may also naturally infect *I* Man 52:13.

Barley yellow dwarf virus: yellow dwarf, nanisme jaune: on *I* Ont 61:5.

Sedum L.

CRASSULACEAE

Mostly perennial plants of nearly cosmopolitan distribution.

1. *S. douglasii* Hook.; BC to Mont and Calif.
2. *S. purpureum* (L.) Lk., live-forever, vit-toujours; naturalized from Europe in Nfld, NS and Ont.
3. *S. rosea* (L.) Scop. (*Rhodiola rosea* L.), Aaron's rod, mille graines; e. arctic Canada, Greenl, Labr and NS; also in Eurasia.
4. *S. spathulifolium* Hook.; BC to Calif.
5. *S. stenopetalum* Pursh; in Canada from BC to Sask.
6. *S. telephium* L.; naturalized from Eurasia in Nfld, NS, Que and Man.

Other host: 7, *S. annuum* L.

Cladosporium herbarum Lk.: on 3 Greenl [899, 901, 902]; on 7 Greenl [900].

Diaporthe muralis Speg.: on 3 Greenl [900].

Dothidella thoracella (Rostr.) Sacc.: on 3 Greenl [900, 902].

Sedum

- Mycosphaerella confinis* (Karst.) Lind (*Sphaerella c.* Karst.): on 3 Greenl [900].
- M. tassiana* (de Not.) Johans. (*Sphaerella pachyasca* Rostr.): on 3 Greenl [901]; on 7 Greenl [900].
- Pleospora penicillus* (Schm.) Fckl. var. *p.* (*Pyrenophora chrysospora* (Niessl) Sacc.): on 7 Greenl [900].
- Puccinia rydbergii* Garrett: III on 4 BC [15, p. 292].
- P. umbilici* Guépin (*P. blyttii* de Toni, *Micropuccinia b.* (de Toni) Rostr.): III on 3 Greenl [900, 901, 902]; on 4 BC [1198; cf. 15, p. 292].
- Septoria sedi* West.: leaf spot, tache septorienne: on *S.* spp. Man, 6 NS 44:116; on 2 Que 25:81, 55:126.
- Synchytrium* sp.: on 1 BC [541].
- Trochila rhodiolae* Rostr.: on 3 Greenl [900, p. 612].

Sempervivum L.

CRASSULACEAE

Succulent perennials of Eurasia.

1. *S. tectorum* L. (*S. juratense* Jordan & Fourr.), hens-and-chickens, joubarbe.

- Endophyllum sempervivi* (Alb. & Schw.) de Bary: rust, rouille: on *S.* spp. BC 34:86, Ont 42:106, 43:116, [cf. 15, p. 239]; on 1, \times *S.* spp. BC 35:68, [535].
- Fusarium* spp.: from 1: *F. acuminatum* Ell. & Ev., *F. solani* (Mart.) App. & Wr. from diseased basal parts of plants in greenhouse Man [335].

Senecio L.

COMPOSITAE

Herbs, shrubs or trees of almost cosmopolitan distribution; a number cult. for their flowers, foliage or climbing habit.

1. *S. aureus* L., spring avens; in Canada in Nfld, NB, Que and Ont.
2. *S. canus* Hook.; Sask and BC to Calif.
3. *S. cruentus* DC., cineraria, cinéraire; Canary Islands; supposedly the origin of the florists' cineraria.
4. *S. cymbalarioides* Nutt.; Yukon, BC and Alta to Calif.
5. *S. integerrimus* Nutt.; Man to BC. 5a, *S. i.* var. *exaltatus* (Nutt.) Cronq. (*S. columbianus* Greene); Alta, BC to Colo and Calif.
6. *S. jacobaea* L., tansy ragwort, herbe de Saint-Jacques; introduced from Europe into Canada in PEI, NS, NB, Que, Ont and BC; a poisonous weed.
7. *S. pauciflorus* Pursh; Que to Man and Alaska.
8. *S. pauperculus* Michx.; Alta.
9. *S. plattensis* Nutt. (*S. ?willingii* Greenm.); Ont, Man and Sask.
10. *S. triangularis* Hook.; Alaska, Yukon and Sask to Calif.
11. *S. vulgaris* L., common groundsel, grand mouron; a weed across Canada; introduced from Europe.

Other host: 12, *S. flavulus* Greene.

- Albugo tragopogonis* (Pers.) S.F.Gray (*Cystopus cubicus* Lév.): on 1 Que 33:122, [8].
- Aphelenchoides* sp.: leaf nematode, nématose foliaire: on 11 BC [535].
- Botrytis cinerea* Pers.: on 23 Alaska [175].
- Entyloma compositarum* Farl.: on 4 Mack [953]; on 7 Labr [957].
- Fusarium* sp.: stem rot, fusariose: on 3 greenhouse Que 45:121.
- Leptosphaerulina pulchra* (Wint.) Barr (*Pleospora oligasca* Bubák): on 2 BC [50].
- Meloidogyne* sp. (*Caconema radiculicola* (Greef) Cobb): root knot, nodosité des racines: on 11 greenhouse BC 32:110.
- Mycosphaerella punctiformis* (Pers. ex Fr.) Starb. var. *clematidis* Jaap: on 8 BC [50].
- M. tassiana* (de Not.) Johans.: on 5 BC [50].
- Phyllosticta garrettii* Syd.: on 10 Alaska [175].
- Pleospora scrophulariae* (Desm.) Höhn. var. *compositarum* (Earle) Wehm. (*P. c.* Earle): on 8 BC [50].
- Pseudomonas* sp.: wilt, flétrissure bactérienne: on 3 greenhouse Man 41:98.
- Puccinia angustata* Pk. (*P. eriophori* Thüm.): 0 I on 1 Ont [828]; on 10 BC [15, p. 194; 1198], Alaska [983].
- P. dioicae* Magn. (*P. extensicola* Plowr.): 0 I on 5a Sask [93, p. 68]; on 12 Alta [15, p. 199].
- P. recedens* Syd.: III on 1 BC [1198], Ont [828], Que 34:109; on 9 Alta [15, p. 196].
- P. subcircinata* Ell. & Ev.: 0 I III on 10 Alta [15, p. 345].
- Pythium* sp.: basal rot, pourridié pythien: on 3 Ont 45:121.
- Ramularia senecionis* (Berk. & Br.) Sacc.: on 10 Alaska [983].
- Septoria senecionis* West.: on 6 NS 44:116, [1138].
- Nitrogen deficiency, carence d'azote: on 3 PEI 50:131.

Setaria Beauv.

GRAMINEAE

Annual or perennial grasses of tropical and temperate areas.

1. *S. glauca* (L.) Beauv. (*S. lutescens* auct.), yellow foxtail, foin sauvage; an annual weed introduced from Europe and now present in BC and E. Canada.
2. *S. italica* (L.) Beauv., foxtail millet, millet des oiseaux; Eurasia, cult. and escaped.
3. *S. viridis* (L.) Beauv. (*Chaetochloa v.* (L.) Scribn.), green foxtail, mil verte; naturalized from Eurasia; a major annual weed in W. Canada and present in all provinces.

Claviceps purpurea (Fr.) Tul: ergot, ergot: on 1 by artificial infection with a rye isolate Alta [172].

Fungi from seed: of 2: *Alternaria tenuis* auct. sensu Wiltshire, *Aspergillus repens* (Cda.) de Bary, *Bipolaris setariae* (Saw.) Shoem. *B. sorokiniana* (Sacc. in Sorok.) Shoem., *Epicoccum nigrum* Lk., *Fusarium equiseti* (Cda.) Sacc., *F. poae* (Pk.) Wr., *Gloeosporium bolleyi* Sprague [*Aureobasidium b.* (Sprague) Arx], *Nigrospora sphaerica* (Sacc.)

Mason, *Papularia arundinis* (Cda.) Fr., *Stemphylium botryosum* Wallr., *Trichoderma viride* Pers. ex Fr., *Trichothecium roseum* Lk., Ont [374].

Fusarium equiseti (Cda.) Sacc.: from discolored basal parts of 3 Man [335].

Pyricularia grisea (Cke.) Sacc.: gray leaf spot, tache grise: on 2 Ont 56:47; on 3 Man [93, p. 124].

Pythium debaryanum Hesse: on 2, 3 Sask [1034].

P. graminicola Subram. (*P. arrhenomanes* Drechs.): browning root rot, piétin brun: on 1, 3 Sask [1034]; on 1 Sask 37:6; from 2 Sask 34:7, 42:5, 27; on 3 Sask 34:7, 37:6, [93, p. 31].

Sclerospora graminicola (Sacc.) Schroet.: downy mildew, mildiou: on 1, 2 Ont 48:29; on 2 Sask 32:108, 33:122, [93, p. 31; 1034]; on 3 BC Sask [1034], Man 31:124, [93].

Ustilago crameri Koern.: smut, charbon: on 2 Sask Ont [292], Sask 40:24, 42:27, Ont 45:36.

U. neglecta Niessl: on 1 Alta Man Ont Que [292], Man [93, p. 62], Ont 32:108, NS [1138].

Shepherdia L.

ELAEAGNACEAE

Deciduous shrubs of N. America.

1. *S. argentea* Nutt. (*Lepargyrea a.* (Nutt.) Greene), buffalo berry, graines de bœuf; in Canada from Man to Alta.

2. *S. canadensis* (L.) Nutt. (*Lepargyrea c.* (L.) Greene), soapberry, soopolallie; Nfld and NS to Alaska.

Cercospora manitobana Davis: leaf spot, tache cercosporéenne: on 1 Man 45:105.

Cylindrosporium shepherdiae Sacc.: on 2 Alaska [175, 1037].

Dasyscyphus bicolor Bull. ex Fckl.: on 2 Alaska [1037].

Fomes ellisianus Anderson: from 1 Sask, for characters in culture see [791, 795].

Puccinia caricis-shepherdiae Davis (*Aecidium allenii* Clint.): rust, rouille des carex: 0 I on 1 Sask [15, p. 211; 93, p. 67]; on 2 BC [535, 1198], Yukon [14], Alta Sask Man Ont Nfld [15], Sask Man [93], Que [828].

P. coronata Cda.: crown rust, rouille couronnée des graminées: 0 I on 2 Alaska Yukon Alta Sask [15, p. 152], Alaska [175], BC 33:122, [1198], Sask 29:78, Sask Man [93, p. 67].

Septoria shepherdiae (Sacc.) Dearn.: leaf spot, tache septorienne: on 2 Alaska [1038], BC [535], Alta 34:109, Man [93, p. 139], NS 45:105.

Sphaerotheca fuliginea (Schlecht. ex Fr.) Poll. (*S. humili* (DC.) Burr. var. *f.* (Schlecht.) Salm.): on 1 Sask, 2 Sask Man [93, p. 45]; this record seems doubtful.

S. macularis (Wallr. ex Fr.) Magn. (*S. humili* (DC.) Burr.): on *S. sp.*, 2 Alaska [175]; on 2 BC 33:122, [50], Sask 31:122, Que DAOM 75273.

Tapesia fusca (Pers. ex Fr.) Fckl.: on *S. sp.* Alaska [176, 1038].

Sibbaldia L.

ROSACEAE

Low depressed perennials of arctic and boreal regions.

1. *S. procumbens* L.; in Greenl and Nfld, and from Que to Alaska.

Botrytis cinerea Pers.: on 1 Greenl [900].

Laestadia potentillae Rostr.: on 1 Greenl [901].

Microthyrium arcticum Oud.: on 1 BC [50].

Mycosphaerella innumerella (Karst.) Schroet. (*Sphaerella i.* Karst.): on 1 BC [50], Greenl [899, 901].

Sibiraea Maxim.

ROSACEAE

Deciduous shrubs of s.e. Europe, Siberia and w. China.

Agrobacterium tumefaciens (Sm. & Towns.) Conn: crown gall, tumeur du collet: on *S. sp.* Ont 49:110.

Sidalcea Gray

MALVACEAE

Annual or perennial herbs of w. N. America.

1. *S. hendersonii* Wats.; BC to Ore.

Ramularia sidalceae Ell. & Ev.: on 1 BC [535].

Silene L.

CARYOPHYLLACEAE

Herbaceous plants of temperate or cold regions.

1. *S. acaulis* L., moss campion; Eurasia. 1a, *S. a.* var. *exscapa* (All.) DC.; Greenl, Nfld, NS and Que to Alaska and BC. 1b, *S. a.* var. *subacaulescens* (F.N.Williams) Fern. & St. John.

2. *S. armeria* L., sweet william, gobe-mouches; introduced from Eurasia and escaped in NB and Que.

3. *S. douglasii* Hook.; BC to Mont and Calif. 3a, *S. d.* var. *villosa* H. & M.

4. *S. menziesii* Hook.; Man to BC and Calif.

5. *S. noctiflora* L., night-flowering catchfly, fleur de nuit; naturalized from Europe; occurs as a weed in all provinces of Canada and in Alaska.

Cladosporium herbarum Lk.: on 1 Greenl [602].

Leptosphaeria silenes-acaulis de Not. (*L. silenes* de Not.): on 1 BC [50], Alaska [175], Greenl [602, 899, 901, 902], Frank [903], Labr Que [52].

Mycosphaerella tassiana (de Not.) Johans. (*Sphaerella sibirica* auct. non Thüm.): on 1 Greenl [602, 899]; on 3 BC [50].

M. tassiana var. *arctica* (Rostr.) Barr: on 1 Frank Que [52].

M. tassiana var. *arthopyrenioides* (Auersw.) Barr: on 1 Labr [52].

Nectria pedicularis (Tracy & Earle) Petr.: on 1 Que [53].

Niesslia pusilla (Fr.) Schroet.: on 1 Que [52].

Pleospora comata Auersw. & Niessl: on 1 Que [52]; on 3 BC [50].

P. herbarum (Fr.) Rabh.: on 1 Greenl [899, 901].

P. penicillus (Schm.) Fckl. (*Pyrenophora chrysospora* (Niessl) Sacc.): on 1 Alaska [1038], Frank [600, 604], Greenl [603].

Silene

Septoria sp.: on 2 BC [535].

S. lychnidis Desm.: on 5 Man [93, p. 138].

S. silenes West.: on 4 BC [1198].

Ustilago violacea (Pers.) Roussel: on 1a BC Que [957], Frank [959, 971]; on 1b BC [959]; the BC collections tend towards *U. v. var. stellariae* (Sow.) Savile [957].

Venturia fimbriata Dearn. & House: on 1 Que [53].

Silphium L.

COMPOSITAE

Coarse perennial herbs of N. America.

1. *S. perfoliatum* L., cup plant; in Canada in Ont.

Puccinia silphii Schw.: III on 1 Ont [828; cf. 15, p. 218].

Sinningia Nees

GESNERACEAE

Low herbs or sometimes woody plants of Brazil.

1. *S. speciosa* Benth. & Hook., gloxinia, gloxinie; the only species widely cult.

Botrytis cinerea: bud rot, moisissure grise des boutons: on 1 Que 48:114.

Meloidogyne incognita (Kofoid & White) Chitwood: root-knot nematode, nodosité des racines: on *S. sp.* BC 57:126.

Tomato spotted wilt virus: spotted wilt, tache de bronze: on *S. sp.* greenhouse Ont 40:93.

Boron deficiency, carence de bore: on *S. sp.* greenhouse PEI 53:123.

Sisymbrium L.

CRUCIFERAE

Mainly annual or perennial herbs of the Old World.

1. *S. altissimum* L., tumbling mustard, moutarde roulante; adventive from Europe; in Canada in all provinces and particularly abundant in the Prairie Provinces.
2. *S. officinale* (L.) Scop., hedge mustard, herbe aux chantres; adventive from Europe occurring in E. Canada and BC.

Other host: 3, *S. humifusum* Vahl (*Arabis humifusa* (Vahl) Wats.).

Albugo cruciferarum S.F.Gray (*A. candida* (Pers. ex Lév.) O.Kuntze): on 1 BC [535], Sask 30:97, Sask Man [93, p. 29]; on 2 BC [535].

Fusarium spp.: from 1: *F. acuminatum* Ell. & Ev., *F. oxysporum* Schlecht. from basal parts, Man [335].

Mycosphaerella tassiana (de Not.) Johans. (*Sphaerella cruciferarum* auct. non Fr.): on 3 Greenl [899]; see *Arabis*.

Peronospora parasitica (Pers. ex Fr.) Fr.: on 1 Sask 30:97, [93, p. 30].

Pleospora herbarum (Fr.) Rabh.: on 3 Greenl [900]; see *Arabis*.

Puccinia aristidae Tracy: 0 I on 1 Sask [93, p. 66; cf. 15, p. 157].

Sisyrinchium L.

IRIDACEAE

Low perennials mainly of the western hemisphere.

1. *S. angustifolium* Mill.; in Canada in Nfld, Que and Ont.
2. *S. montanum* Greene (*S. angustifolium* auct.), blue-eyed grass; in Canada from Nfld and Que to Man, Mack, Yukon, Alta and BC.

Brencklea sisyrinchii (Ell. & Ev.) Petr.: on 2 Man [93, p. 132].

Mycosphaerella tassiana (de Not.) Johans.: on 2 BC [50].

M. tassiana var. *arctica* (Rostr.) Barr: on 2 Que [53].

Sitanion Raf.

GRAMINEAE

Tufted perennial grasses of w. N. America.

1. *S. hystrix* (Nutt.) J.G.Sm.; in Canada in BC.

Claviceps purpurea (Fr.) Tul.: 1 artificially infected with the fungus from rye Alta [172].

Mycosphaerella tassiana (de Not.) Johans.: on 1 BC [50].

Sium L.

UMBELLIFERAE

Smooth perennial herbs of the northern hemisphere and Africa.

1. *S. suave* Walt. (*S. cicutifolium* Schrank), water parsnip; Nfld and NS to BC and Alaska; also in e. Asia.

Fusicladium depressum (Berk. & Br.) Sacc.: on leaves of 1 Man [93, p. 119].

Septoria sii Rob. & Desm.: on leaves and stems of 1 Man [93, p. 139].

Uromyces lineolatus (Desm.) Schroet. (*U. scirpi* (Cast.) Burr.): 0 I on 1 Sask Man 34:109, [93, p. 73], Ont [828], Que 32:108, [cf. 15, p. 191].

Smilacina Desf.

LILIACEAE

Perennial herbs of boreal and temperate regions.

1. *S. racemosa* (L.) Desf., Job's tears, raisinette; in Canada from Que to BC.
2. *S. stellata* (L.) Desf.; in Canada from Nfld and NS to BC.

Colletotrichum dematium (Fr.) Grove: on old stems of 2 Man [93, p. 129].

Cylindrosporium smilacinae Ell. & Ev.: on 1 BC Que [963], Que 33:122.

C. smilacis Ell. & Ev.: on 2 Man [93, p. 130].

Phyllosticta convallariae Pers.: on 2 Man [93, p. 134].

Puccinia amphigena Diet.: 0 I on 2 Sask [93, p. 65], Man [15, p. 145]; the rust is more likely to be *P. sporoboli* Arth. [828].

- Puccinia sessilis* Schneid. ex Schroet.: 0 I on 2 BC Man Ont [15, p. 131], Sask Man [93, p. 71].
P. sporoboli Arth.: 0 I on 2 Ont [828; cf. 15, p. 135].
Ramularia smilacinae Davis: on 1 BC [963].
Uromyces acuminatus Arth. var. *magnatus* (Arth.) Davis: 0 I on 2 Sask [93, p. 72; cf. 15, p. 169].

Smilax L.

LILIACEAE

Shrubby or herbaceous plants of the tropics, N. America, the Mediterranean region and e. Asia.

1. *S. herbacea* L., carrion flower, raisin de couleuvre; in Canada from NB and Que to Man.
2. *S. lasioneura* Hook. (*Nemexia lasioneuron* (Hook.) Rydb.); in Canada from Ont to Sask.

Colletotrichum dematium (Pers. ex Fr.) Grove (*C. liliacearum* Ferr.): on living leaves and stems of 1 Man [93, p. 129]; according to Scoggan [975], only 2 is known in Man.

Metasphaeria dearnessii Bubák: on living leaves of 1 Man [93, p. 54].

Phyllosticta hispida Ell. & Dearn.: on 1 Man [93, p. 135].

Puccinia amphigena Diet.: 0 I on 1 Man [15, p. 145; 93, p. 65]; on 2 Sask 24:59, 30:95, [93], Sask Man [311]; from an examination of the urediniospores of the rust on *Calamovilfa*, it seems probable that the species present is *P. sporoboli* Arth. [828].

Ramularia subrufa Ell. & Holw.: on leaves of 1 Man [93, p. 125].

Stagonospora smilacis (Ell. & Mart.) Sacc.: on leaves of 1 Man [93, p. 141].

Solanum L.

SOLANACEAE

Herbs, shrubs, or sometimes trees of the temperate and tropical regions around the world; several are of horticultural or agricultural importance.

1. *S. melongena* L.; probably a native of s.e. Asia. 1a, *S. m.* var. *esculentum* Nees, eggplant, aubergine; commonly cult. as an annual for its purple fruits.
2. *S. nigrum* L., common nightshade, tue-chien ou blouet de jardin; naturalized from Europe from NS to Man and Alta; the host in these records may be *S. americanum* Mill. or other species.
3. *S. pseudo-capsicum* L., Jerusalem cherry, cerisette; introduced from s. Europe; grown in Canada as a potted plant for its ornamental fruits.
4. *S. triflorum* Nutt., wild tomato; BC to Ont and south.
5. *S. tuberosum* L., potato, pomme de terre; native to the temperate Andes and cult. very extensively in Canada. An important food plant.

Other hosts: 6, *S. chacoense* Bitt. 7, *S. demissum* Lindl. 8, *S. gibberulosum* Juz. & Buk. 9, *S. jamesii* Torr. 10, *S. phureja* Juz. & Buk. 11, *S. miniatum* Bernh.

Alternaria consortialis (Thüm.) Groves & Hughes (*Stemphylium consortiale* (Thüm.) Groves & Skolko): leaf spot, tache alternarienne: The pathogen was detected as the cause of a leaf spot in BC, when leaves of 5, in part affected by *A. solani*, were examined, 46:52, [535]. Wright [1185] noted that the spots were light brown and lacked the concentric rings typical of early blight. The fungus was pathogenic to tomato, tobacco and 2.

A. solani (Ell. & Martin) Jones & Grout (*Macrosporium s.* Ell. & Martin): early blight, brûlure alternarienne: on 1a Man 44:46, [93, p. 112], Ont 55:62, Que 53:60, NS 32:38, PEI 34:34, [cf. 1138]; on foliage of 5 BC-PEI 24:40, BC [535], Sask Man [93], Nfld 49:xviii. On tubers, Ont 38:44, NB 29:36, NS 33:31, PEI 30:47, 54:71, [cf. 1138].

Early blight is a common disease of potato across Canada and infection may be severe in some years, causing premature death of the plants and losses in yield Alta Sask 23:97, NS PEI 31:46. Early cultivars appear to be the most affected PEI 31:46, and Keswick and Canso, which were resistant to late blight when first released, appeared to be very susceptible, 50:67. Spraying with nabam-zinc sulphate or maneb seemed to reduce the incidence of early blight NS 55:70.

A. solani was used to test the fungicidal activity of methyl bromide. The action of the fumigant was dependent on the water vapor pressure through its effect on spore hydration [753].

A. tenuis auct. sensu Wiltshire (*A. fasciculata* (Cke. & Ell.) Jones & Grout): on 1, probably secondary following infection by *A. solani*, Que 31:40.

Armillaria mellea (Vahl ex Fr.) Kummer: root rot, pourridié-agaric: rhizomorphs of the fungus in tubers of 5 on newly cleared land BC 34:45, [535], Man 21:60, 24:41.

Ascochyta lyopersici Brun.: leaf spot, ascochytose: on 1a Que 58:57; on 5 BC 53: 65, [535], Alaska [175].

Bacillus polymyxa (Praz.) Migula: cause of decay of tubers of 5 in storage in Alta. The organism occurs widely in Alta soils, but under recommended temperatures for storage no damage should occur in stored tubers [492].

Botryosporium longibrachiatum (Oud.) Maire: on dead and dying 5 in greenhouse NB 36:37, [1138].

Botrytis cinerea Pers.: gray mold, moisissure grise: on fruit of 1a Ont 33:26, on plants in greenhouse Alta 53:60. On 5 Alaska [175], BC 43:60, [535], Que NS 39:58, NB 24:41, 31:50, PEI 32:50, Nfld 29:xix, [cf. 1138]; a minor pathogen of potato, affecting various parts of the plant including the tubers.

Cephalotrichum stemonitis (Pers.) Lk. (*Stysanus s.* (Pers.) Cda.): on rotted tubers of 1 Man [93, p. 127].

Colletotrichum coccodes (Wallr.) Hughes (*C. atramentarium* (Berk. & Br.) Taub., *C. tabificum* (Hallier) Pethybr.): black dot or anthracnose, dartrose: on 5 Alta NB 36:37, Sask PEI 32:50, Ont 62:59, Que 22:127, 24:41, Que PEI [260], NS 42:54. Black dot has been noticed mainly in Que. Dickson [260] described the disease and discussed the taxonomy of the pathogen. In a recent study, Santerre [942] found that silver scurf was widespread on potato tubers in Que, whereas few tubers carried the anthracnose pathogen. However, in one lot 27% of

the tubers gave rise to diseased plants; see also *Lycopersicum*.

Cornebacterium sepedonicum (Spieck. & Kotth.) Skapt. & Burkh. (*Phytomonas sepedonica* (Spieck. & Kotth.) Magrou): bacterial ring rot, flétrissure bactérienne: Bacterial ring rot is probably the most serious disease of potatoes in Canada; when left uncontrolled losses are heavy in the field and the crop may become a total loss in storage, 34:43. It is also a most troublesome one to control because of the difficulty of detecting traces of infection. Ring rot was first recognized as a distinct disease in Que in 1931, 31:39, by Baribeau [48], who showed that it was widely distributed in Que by 1934. The causal organism was isolated by Savile and Racicot [972] and shown by them to be closely related to *C. sepedonicum*, whereas Burkholder [151] concluded that the bacterium was identical with that species. In most provinces the disease was recognized in the next few years: BC 42:54, [535], Alta-Ont PEI 38:45, NB 37:35, NS 39:50, and more recently in Nfld 53:67. It was also widely disseminated in the US, 39:50. Losses have rarely been estimated; in 1947 the loss in Que was placed at 10–12% of the crop, a loss of about \$2,000,000, 47:61.

The bacteria live over in slightly infected tubers and are readily spread from diseased tubers to healthy sets by the cutting knife and the picker-planter. Racicot et al. [866] gave directions for diagnosis of suspected samples. The use of affected seed appeared to be the most common way that the disease is introduced on a farm. Observations also suggested that ring rot is spread by the use of contaminated machinery, utensils, storage bins and sacks, Alta Ont 40:45.

Because potatoes are an important crop in the irrigated districts of Alta, the provincial department of agriculture instituted an annual survey to assist farmers to recognize ring rot and to help them bring the disease under control, 39:50. In 1943, areas in which the disease was known to exist were designated pest areas and the growing of potatoes and the sale of affected crops were restricted, 43:60. These measures reduced the intensity of infection from 25–35% to about 4% and the percentage of diseased fields also declined, 47:61. These and other measures have kept losses low in Alta, but they have failed to eliminate ring rot, 54:75, 56:69. A similar provincial survey in Ont, begun in 1943, 43:60, has also kept losses down but has not wiped out the disease.

An important industry in Canada has been the production of certified potato seed. Such seed possesses a great advantage over table stock because of its relative freedom from virus diseases. For this reason table stock growers have relied heavily on certified seed for their own plantings. Nevertheless, the use of certified seed undoubtedly helped to spread bacterial ring rot to widely scattered areas of Canada. In 1936, 5 years after ring rot was first recognized in Que, seed lots were rejected for certification if even a trace of the disease was found in field or bin, 36:34. Despite this drastic regulation, the presence of ring rot has continued to be one of the major causes of rejection of seed crops entered for certification, especially in Que and more recently in NB, 58:63. In PEI the introduction of custom-operated mechanical seed cutting and planting machinery was considered to be the cause of increased rejections, 63:95. Today, tubers indexed for Foundation seed are checked by the smear method for possible presence of the bacterium and, if any gram-positive bacteria are observed, the seed lot is disqualified. Moreover, in PEI it is now provin-

cial law that all equipment must be steam cleaned and disinfected before moving from one farm to the next. The results of one year's operation suggest that ring rot is at last being eliminated. The program will undoubtedly spread if these preliminary results are confirmed [MacLachlan in litt.].

Perrault [838] demonstrated experimentally that ring rot is disseminated most effectively through the seed, followed by the cutting knife. Volunteer plants may be the source when potatoes are grown for a second year in the same field. Less infection was obtained from planting small or whole tubers than from large tubers cut into sets. Insects do not seem to be a factor. Ring rot was not transmitted through the soil and normal culture practices did not spread the disease.

From a study of the nutritional requirements of the organism, including vitamins and amino acids, MacLachlan and Thatcher [658] developed a more suitable medium for the isolation and maintenance of *C. sepedonicum* in culture. These same requirements were more critically examined by R. A. Lachance [575, 576]. Paquin et al. [821] found that *C. sepedonicum* did not produce pectic enzymes nor are the latter found in tubers affected by ring rot.

Racicot et al. [866] devised the smear method for the detection of *C. sepedonicum*, Katznelson and Sutton [544] reported improved methods of detection of infected tubers, and R. O. Lachance et al. [582] found that the smear method of indexing tubers was superior to the broth or Petri plate method. The smear method, slightly modified, proved most accurate although it was not 100% effective.

In field trials six of the most active antibiotics, previously selected by the paper-disc method, were used as a tuber soak by MacLachlan and Sutton [657] on tubers inoculated by needle puncture about the eyes; Terramycin proved the most promising. Paquin et al. [822] tested not only antibiotics but also detergents, quaternary ammonium salts, mercury compounds, disinfectants and protectants as seed piece disinfectants on sets inoculated by dipping in a bacterial suspension. None was as effective as a 10-minute dip in an acidified mercury chloride solution (2/1000 plus 1% HCl), which gave 93–98% control. Perrault [839] had earlier come to much the same conclusion; he proposed that ring rot may be eliminated from a lot of tubers by planting in tuber units and roguing out any infected units, provided every sanitary precaution is taken to prevent spread.

Contaminated potato bags were early suspected as a source of ring rot infection. A method of determining the viability of the bacterium after storage involving heat and gas treatments was developed [881]. Richardson and Buckland [882] found that the thermal death point of *C. sepedonicum* on contaminated fibers treated in air varied with the moisture content of the air. In these experiments where the temperature was maintained at 70 C, the minimum time for the destruction of the bacteria was 72 hr. MacLachlan and Racicot [656] found the quaternary ammonium compound Ocean 101 to be a practical and useful disinfectant for potato bags against ring rot bacteria. They also obtained successful control of the organism by passing jute bags singly through an infra-red oven, when they were exposed for 90 seconds. According to MacLachlan [652] the recommended treatment was to heat a bale of bags in a vault until the temperature of the bale reached 120 F and to hold for one hour. He reported that a 30-min exposure in an electronic oven was sufficient to kill the ring rot bacteria on heavily contaminated jute strands placed through-

out a 100-bag bale, although the bale temperature was lower than the experimentally determined death point of the bacteria. As a result of fumigation trials with various gases, MacLachlan et al. [655] proposed fumigation with ethylene oxide. Richardson and Munro [883] reported that while ethylene oxide, though toxic, failed to penetrate and methyl bromide was not sufficiently toxic at practical dosages, a mixture of 5% ethylene oxide and 10% methyl bromide eradicated the bacteria throughout the bale in 18 hr.

Some cultivars, such as Teton, are resistant but not immune to ring rot, 46:46, 50:68. Erie and Saranac also proved highly resistant according to Génèreux and Lachance [323], who found a root inoculation technique to be the most effective in testing cultivars and new lines for resistance to the disease.

Cylindrocarpon radicola Wr.: caused a limited reduction of growth of 5 when added to the soil in comparison with *Pratylenchus penetrans* (q.v.) [421].

Ditylenchus destructor Thorne: nematode tuber rot, pourriture nématique: on 5 BC 52:59, [102, 535], PEI 45:66. The nematode is not regarded as a serious pest to the potato industry in PEI, because the organism has shown no tendency to spread, 48:xv, 49:xiv.

Entyloma australe Speg.: on 4 Sask Man [93, p. 60; 292].

Erwinia atroseptica (van Hall) Jennison (*E. phytophthora* (Appel) Holland, *E. solanisapra* (Harrison) Holland): black leg, jambe noire: on 5 BC-PEI 24:41, Nfld 49:xviii, common in Sask Man [93, p. 29], [cf. 1138]. *E. atroseptica* is responsible for important losses in potato production, causing seed-piece decay and black leg [894]. It has been destructive in table-stock fields under irrigation in s. Alta, 54:77. The disease may be serious in wet seasons. Delay in planting the sets after they are cut results in an increase of black leg Man 44:58, NB 47:64, PEI 45:65. Its presence is regularly the cause of rejection of fields entered for certification, particularly in PEI and Que and in some years in other provinces. For an early account of the disease and its control see [757].

At one time treatment of the seed was fairly general in some areas and there is evidence that it greatly reduced infection from black leg NS 34:41, 35:35. Treating the cut sets with antibiotics containing streptomycin reduced losses. Treatment lessened the incidence of black leg, reduced bacterial seed-piece decay and improved plant vigor. Foliar applications also reduced the severity of the disease [894]. When it became imperative to control black leg, fusarium dry rot and verticillium wilt, the organic mercury Semesan Bel proved the best all-round seed treatment chemical, but under somewhat unfavorable planting conditions its phytotoxicity reduced its value [892].

Sebago, a popular cultivar in PEI, appears to be susceptible Ont 55:74, NS 52:59, PEI 50:70; other susceptible cultivars are Fundy and Keswick PEI 61:76.

E. carotovora (L.R.Jones) Holland: bacterial soft rot, pourriture molle bactérienne: in tubers of 5 BC 61:76, [535], Alta 53:69, Sask 46:49, Man 40:44, Ont PEI 45:66, Ont 56:73, Que 47:65, NB 53:69, NS 49:59, Nfld 52:69. Bacterial soft rot is not common, but tubers harvested when the soil is excessively wet or stored under poor conditions may become affected.

Erysiphe cichoracearum DC. ex Mérat: powdery mildew, blanc: on 2 BC [50]; severe on leaves of 7 in greenhouse NB 54:78. 7 and 8 were the most susceptible

of the wild potato species and Green Mountain, Plymouth and Delus among the cultivars NB 56:73. As only the oidial state was observed, the fungus may be *E. polyphaga* Hammerlund, cf. 48:105.

Fusarium spp.: dry rot, pourriture sèche fusarienne: on tubers of 5 in storage BC 31:48, Alta 35:37, Sask 42:56, Man 21:60, Ont 33:33, Que 42:56, NB PEI 30:47, NS 55:76, Nfld 50:72. According to Robinson and Ayers [889], dry rot greatly increased in PEI when the susceptible Sebago replaced Irish Cobbler as the leading commercial cultivar. Losses reached a peak in the 1946 and 1947 crops, some growers losing 50% and many 5-10% of their crops.

Two species predominate: *F. coeruleum* (Lib.) Sacc., BC-NB PEI [335; cf. 333], *F. sambucinum* Fekl. f. 6 Wr., BC-Man Que NB PEI [335], NS 58:67. Other species recorded were: *F. acuminatum* Ell. & Ev., Man Ont [335]; *F. avenaceum* (Fr.) Sacc., Alta 42:56, Ont PEI [335]; *F. culmorum* (Lib.) Sacc., Alta 45:67; *F. oxysporum* Schlecht., Man Que [335], PEI 41:43; *F. o. var. redolens* (Wr.) Gordon, BC Man; *F. sambucinum* Fekl., BC Man Ont; *F. solani* (Mart.) App. & Wr., Man Ont; *F. sporotrichioides* Sherb., Man [335]. *F. equiseti* (Cda.) Sacc. was isolated from sporodochia on the surface of decayed tubers, Man; and *F. sambucinum* var. *coeruleum* Wr. from enlarged lenticels, Ont [335]. In PEI in nearly all tubers examined *F. sambucinum* f. 6 was present. In a few minor instances, rot was found to be caused by *F. coeruleum* and *F. avenaceum* [889].

Fertile perithecia of *Gibberella cyanogena* (Desm.) Sacc. have not been found in nature in Canada. However they develop readily in culture when two appropriate mating types are brought together. Mass isolates of *F. sambucinum* f. 6 each from a different source have yielded cultures only of a single mating type. Mating type *a* was found in mass cultures from BC, Sask and NB and mating types *A* and *a* occurred separately in mass cultures from Man and PEI, 51:62, [cf. 336]. From cytological studies, the chromosome number of *G. cyanogena* was determined to be $n = 4$. The numbers in the perfect state of six other species of *Fusarium* are reported [474].

Ayers [28, 30] determined the resistance to decay caused by *F. sambucinum* f. 6 and *F. coeruleum* of many cultivars and unnamed seedlings, using the susceptible Sebago and Keswick respectively as standards. Reaction varied widely. Since verticillium wilt (q.v.) became a problem, he [32] has tested many of the same cultivars and seedlings for resistance to wilt as well as to dry rot. In general, a cultivar resistant to one disease is susceptible to the other. Whether resistance to the two diseases can be combined in the same cultivar remains uncertain.

Ayers and Robinson [34] obtained a good measure of control of dry rot in stored tubers by treating the seed pieces with the organic mercury Semesan Bel before planting. The fungicide is believed to destroy much of the seed-borne inoculum. It has proved the best all-round seed treatment chemical [892].

Fusarium spp.: fusarium wilt, flétrissure fusarienne: on 1 Man 38:34. *F. equiseti* (Cda.) Sacc. was isolated from the base of wilted plants and *F. acuminatum* Ell. & Ev. from decayed fruit Man [335].

Fusarium spp., mainly attributed to *F. oxysporum* Schlecht.: fusarium wilt, flétrissure fusarienne: Wilt caused by *F. spp.* is not well separated from wilt caused by *Verticillium* spp. (q.v.), which appears to be gaining in importance; on 5 Alaska [175], BC-PEI 24:40. The disease is widespread in Canada, but the most severe infections were reported in

Solanum

Sask and Man. Isolations from stems, stolons and roots of wilted plants yielded: *F. acuminatum* Ell. & Ev., Man; *F. culmorum* (W.G.Sm.) Sacc., Man; *F. oxysporum*, Sask Ont; *F. o. var. redolens* (Wr.) Gordon, Man; *F. o. f. tuberosi* Snyder & Hansen, BC Man; *F. solani* (Mart.) App. & Wr., Man [335].

Fusarium solani (Mart.) App. & Wr. var. *eumartii* (Carp.) Snyder & Hansen: stem-end rot, nécrose fusarienne du talon: recorded on 5 Sask 43:63, Ont 37:38, 39:52, Que 41:43. The organism was isolated from tubers affected by vascular necrosis Ont 1939, [335].

Helminthosporium solani Dur. & Mont. (*H. atrovirens* (Harz) Mason & Hughes, *Spondylocadium a.* (Harz) Harz ex Sacc.): silver scurf, tache argentée: on tubers of 5 BC-NB PEI 24:40, NS 34:43, [cf. 93, p. 127; 1138]. Silver scurf is a minor disease, although infection may be moderate to severe in some years Ont 54:57, NS 45:70, PEI 42:59; it is more prevalent in early cultivars BC [535]. After a period of incubation, Santerre [942] found that all tubers examined in Que, whatever the cultivar or local origin of the tubers, developed the disease. However, Avon and Irish Cobbler seemed the least susceptible.

Heterodera rostochiensis Wr.: golden nematode, nématode doré: This nematode was discovered in October, 1962, in Nfld 63:96, [801]. The whole island is being carefully surveyed for the nematode; quarantine regulations first enacted against potatoes grown in Nfld on account of wart (q.v.) are in force.

Meloidogyne sp. (*Heterodera marioni* (Cornu) Goodey): root-knot nematode, nodosité des racines: on tubers of 5 BC 38:54, [535]. More recently *M. arenaria* (Neal) Chitwood was reported on 5 in BC, 59:57; and *M. hapla* Chitwood on 1a in s.w. Ont, 61:376.

Oospora pustulans Owen & Wakefield: skin spot, tache de la pelure: on tubers of 5 Alta 39:58, Man PEI 24:41, Ont 49:61, NB 30:48, NS 33:34, Nfld 55:38, [cf. 1138]. The disease is rarely reported.

Paratrioza cockerilli (Sulc): psyllid yellows: Psyllid yellows, caused by feeding of the potato psyllid, was first observed in Alta in 1919; in 1932 over 100 acres of potatoes were a total loss. Sanford [927] described the symptoms. In most years the injury to potatoes centered about psyllid-infested greenhouses, where the tomato crop suffered a reduction in yield and quality. In 1938 an epidemic of psyllid yellows which occurred in Canada was the northern extension of a much larger epidemic centering in the States to the south and yellows was reported in s.e. BC, s. Alta and s.w. Sask, 38:50. A further loss occurred in 1939, when planting tubers affected by net necrosis resulted in misses and weak plants, 39:55. However, the latter plants had normal tubers [941]. The insect has been rarely reported in recent years [C.G.MacNay in litt.].

Pellicularia filamentosa (Pat.) Rogers (*Corticium solani* (Prill. & Del.) Bourd. & Galz.; stat. steril., *Rhizoctonia solani* Kühn): rhizoctonia, rhizoctonie: cause of damping-off, fonte des semis, etc., of 1a Man 44:46, Ont 53:60, 54:66; losses may be heavy, 50:56.

On 5 Alaska [175], BC-PEI 24:40, NB NS PEI [1138], Nfld 49:xviii, 55:76; common and often injurious to tubers, stems and stolons of 5 Sask Man [93, p. 125].

Rhizoctonia is a disease of some importance in potato production. Misses caused by seed-piece decay may be prevalent NB 39:49; stem canker may be severe Alta 39:49, Sask 45:67, PEI 38:43; or black scurf may be abundant, reducing the market value of the crop. Rhizoctonia appears to be most prevalent in the Prairie Provinces. Severe scurf

development is most often noted on early cultivars, such as Irish Cobbler, BC 31:45, PEI 32:44. The perfect state is not uncommon on the lower stems of 5 BC 46:50, Sask 50:72, 54:78, Sask Man [93, p. 76], NS 37:34, PEI 44:60.

Sanford [930] found that isolates mainly from sclerotia on tubers but also from stem lesions and basidiospores differed in their pathogenicity on potato. More isolates were pathogenic when potatoes were grown in an infertile podsol than when the plants were grown in a fertile black soil. Although the pathogenicity of isolates varied greatly, Sanford [934, 936] reported that certain pathogenic isolates were specialized to their hosts. Between 16 and 23 C [931], the pathogen was equally virulent at moisture levels of 19-40% of the water-holding capacity of the soil. At 25 C the amount of disease in young sprouts fell off abruptly. Affected plants tended to recover by producing secondary or tertiary sprouts, especially in wet soil. *R. solani* is much more virulent when the inoculum is introduced into black loam with its natural microflora than when the same soil is steam-sterilized and inoculated [923]. The pathogen is most virulent when its hyphae are young, thin and still hyaline, but once the mycelium begins to mass it is no longer virulent. Its persistence in the soil depends upon susceptible hosts being grown [936]. A heavy infestation, when potato plants were absent, almost completely disappeared by June of the next year.

The observation is frequently made that black scurf increases with increased maturity of the tubers Man 21:57, 40:43, Ont 51:63, PEI 29:33. Hurst and Peppin [488, 837] recommended that growers in PEI harvest their crop 1-2 weeks earlier than the usual dates of 20 September for Irish Cobbler and 1 October for Green Mountain. The harvesting, they note, must be done carefully as the immature tubers are liable to injury, which may result in heavy losses in storage. The use of vine killers to arrest further development of the crop for the control of late blight in the tubers tends to reduce black scurf development.

Treatment of potato sets before planting was originally recommended to control rhizoctonia and scab. Hurst [489] outlined the steps and precautions for effectively treating potatoes with mercuric chloride. Sanford [929] found that treatment with acidified mercury chloride significantly reduced infection, although a variable amount of infection arose from the untreated soil.

Phoma sp.: phoma rot, pourriture phoméenne: A phoma rot has been reported several times, usually in trace amounts. The pathogen has usually been called *P. tuberosa* Melhus, Rosenb. & Schultz BC 34:43, [535], Alta 38:48, NB 32:49, 62:62, PEI 26:26, 29:36; in one instance it was called *P. ?foveata* Foister NB 52:62.

Phomopsis tuberivora Güssow & Foster: stem-end hard rot, pourriture ferme du talon: When the disease was first found in 1930, it was observed on several cultivars of 5 on Vancouver I. and the Fraser Valley, BC. At the usual storage temperatures, the rot makes little progress, 32:48, [309; 393, p. 253; 535]. The disease has been reported only a few times since, 39:54, 48:57.

P. vexans (Sacc. & Syd.) Harter: phomopsis blight, brûlure phomopsienne: on 1a BC 30:42, Ont 33:25, Ont Que 38:33.

Phyllosticta sp.: on 5 Alaska [175].

Physarum cinereum (Batsch) Pers.: on tubers of 5 Alta 36:37.

Phytophthora erythroseptica Pethybr.: pink rot, pourriture rose: on 5 BC 43:63, [535], Man Que 45:68,

Ont 46:51, NB 55:77, NS 63:97. Jones [533] studied the disease and the pathogen as it occurred in BC. A similar pink rot was found in 1954, but the pathogen closely resembled *P. cryptogea* Pethybr. & Laff., 54:79.

Phytophthora infestans (Mont.) de Bary: late blight, mildiou: on 1a Ont 25:45, PEI 29:29; on 2 NS 52:62; on 5 Alaska [175], BC [535], Ont-PEI 24:39, Alta 43:63, Sask 46:50, Man [93, p. 30], Nfld 50:73.

Late blight is one of the most important diseases of potato because of its epidemic nature. In PEI and the other Atlantic Provinces it is almost impossible to grow potatoes profitably unless they are protected by frequent applications of a fungicide, cf. 41:46. In the 5 years 1915-19, Paul L. Murphy, 20:43 estimated the average annual loss to be 43% in PEI, 30% in NS and 25% in NB, a loss of \$8,558,000 per year. The figure for PEI is approximately correct, as in 1945-51, L. C. Callbeck, 51:64, showed that the average yield of marketable tubers was increased by 40% in the Bordeaux-treated plots over the plots that received no fungicide. Late blight causes substantial losses in the Fraser Valley, BC, 48:57, occurs less frequently on Vancouver I., and rather infrequently in the BC interior, 41:46. In the Prairie Provinces, late blight was observed in Man in 1927 and 1928 and again, except for one year, from 1941 to 1957, 57:72. In Sask late blight was reported from 1946 to 1956, except for one year, 57:72. In Alta late blight was recorded in 1943 and 1944 and again from 1952 to 1957, 57:72. A severe epidemic occurred in Man in 1944, 44:61, and in Alta Sask and to some extent in Man in 1954, 54:57. In Ont and Que, late blight is present every year, but a general epidemic occurs only sporadically in Ont, 40:47, 48:57, and somewhat more frequently in Que, 48:57, 51:64. A year when late blight has been severe usually results in its greater prevalence at an early date in the following year PEI 42:57. Thereafter its development depends on the weather conditions of the current year. The effect may last longer, as late blight was epidemic in PEI in 1941, 41:64, and again in 1943, 43:63.

Before 1949 there was little evidence of physiologic races of *P. infestans* in Canada. In 1951 the new cultivars, Keswick and Canso, previously resistant, blighted in the field. One isolate from these cultivars caused infection on all the differential hosts in the test [471]. The occurrence of race 1.2.3.4. was confirmed and the reaction of many lines of *S. demissum* and of several species hybrids to the new race was reported [470].

In the period 1954-56, Howatt, 56:75, [469], identified 14 races of *P. infestans* from across Canada. Race 4, a common race, was widely distributed, but most other races occurred only in the Maritime Provinces. Graham [343] isolated eight races from 70 isolates from across Canada; of these races two were distinguished by their reaction on *Lycopersicon* (q.v.). The so-called common race is actually composed of races 0 and 4. *P. infestans* is thought to be heterokaryotic and both the hosts and artificial culture may exert selective pressure upon components of the common race. Pure lines of several races were maintained with their original virulence for considerable time on oatmeal agar after they were isolated from single zoospores. Graham et al. [346] showed that by culturing a race of *P. infestans* on juvenile or senescent leaves of a resistant host by successive passages on resistant and susceptible hosts, the fungus could be induced to mutate. In successive passages on a susceptible host, the fungus underwent no change in its pathogenicity, Graham and Hodgson [347] found that races 1.3.4 and 1.4 appeared more frequently on R₁R₃R₄ selections pos-

sessing little or no minor gene resistance than in those with a high level of minor and major gene resistance. Combinations of major and minor gene resistance may be useful in areas where late blight is moderate and sporadic in appearance. Graham [344] reported on the inheritance of resistance of *P. infestans* in certain diploid Mexican species of *Solanum* and their value as sources of blight resistance. Graham and Wright [348] found oospores of *P. infestans* in paired isolates of Canadian origin. As all Canadian isolates belong to the A₁ group, the authors discuss how the production of oospores came about. Hodgson [465, 466] described a laboratory test that permitted the assessment of the partial resistance of potato cultivars and the type of resistance each possesses to infection and to mycelial growth and sporangium production.

Payette and Perrault [835] found that *P. infestans* required thiamine in small amounts for growth; no other substance caused a favorable response.

Spraying for late blight was not widely practised in Canada before 1915, when Murphy [755] showed experimentally that five thorough sprayings with Bordeaux 6-4-40 sufficiently controlled the disease to ensure a profit. He [757] considered that the principal causes of failure were poor equipment, insufficient spray and stopping the applications too early. Murphy reviewed fully all phases of the spraying operation including the destruction of the tops 10-14 days before digging. He considered that a minimum of four applications of Bordeaux 4-4-40 was necessary. As a result of experiments in 1943-48, Callbeck [163] found that Bordeaux 4-2-40 was the best Bordeaux formulation. He has also reported that at least six applications are required to control late blight; yet less than 25% of the growers in PEI made the necessary applications. When tank-mix zineb was first used the control was inferior compared with Bordeaux, but by 1951 this fungicide properly applied controlled late blight and increased the yield of marketable tubers by 75% compared with 40% with Bordeaux, 57:68. Spraying was superior to dusting [161]. Berkeley et al. [79] also found that zineb (nabam plus zinc sulphate) improved the yields over Bordeaux, although the control of leafhoppers by DDT contributed most to increased yields in these Ont experiments.

In his later tests of potato fungicides, Callbeck [160, 168] found maneb superior to zineb (nabam plus zinc sulphate). Later zineb (ammonium ethylene bisdithiocarbamate plus zinc sulphate) surpassed maneb. In 1960 the season was dry and almost no late blight developed; under these conditions the copper preparations were more toxic than the organic fungicides. In the 1961 season late blight failed to develop. In 1962 and 1963 various thio-carbamates, notably Dithane M-45 (zinc ion plus maneb) and related compounds were outstanding, but other organic compounds, such as analogues of captan, have shown promise. For several years M.C.O. (50% Cu as copper oxychloride, 0.6% Hg as phenyl mercury chloride) was tested. The preparation alone or with an added organic fungicide was not outstanding. Moreover Ross and Stewart [898, 1055] showed that mercury accumulated first in the foliage and later in the tubers during the period of their rapid increase in size. Accordingly, there seems no valid reason for using such a hazardous preparation. Callbeck [164, 166] found that zinc improved yields provided that late blight was kept under control. In a split schedule, in which a carbamate was applied in the early sprays and Bordeaux in the late, the yield of marketable tubers was less than when either fungicide was used throughout the season [169].

Hodgson [463, 464, 467] investigated the use of antibiotics in the control of late blight. In 1957, when the disease was severe, dihydrostreptomycin gave satisfactory control. He found that M.C.O., maneb and this antibiotic possess an eradicant effect on late blight, and reduced necrosis of the leaf and sporulation of the fungus.

In 1921 Murphy [757] proposed cutting and removing the vines or spraying the plants with copper sulphate or sodium arsenite to kill the vines in years when the growing season was prolonged. The tubers should only be harvested 10-14 days later. Callbeck [160, 162] tested several vine killers. Although highly poisonous, sodium arsenite is the most popular. Their use may cause discoloration of the vascular tissue. In a later test [167], he concluded that discoloration is most pronounced if the herbicide is applied when soil moisture is low.

The Canadian cultivars Canso and Keswick, licensed in 1950, and Kennebec, a US cultivar licensed in Canada in 1951, were highly resistant when first developed, but even in 1951 traces of late blight were seen in a few fields of these cultivars in Que, NB and NS, 51:64. Next year the disease was severe on Canso in parts of PEI, 52:62, and, if grown, these cultivars had to be sprayed.

Pratylenchus penetrans (Cobb) Filip. & Stekh.: root-lesion nematode, nématose des racines: on 1a Ont 61:69, 376.

P. pratensis (de Man) Filip.: meadow nematode, nématode des prés: Hastings and Boshier [421] found that *P. pratensis* reduced growth of 5 to a marked degree. The presence of *Cylindrocarpon radiculicola* (q.v.) enhanced the inhibition of growth. A method of securing cultures of the nematode free from fungi and bacteria is described.

Pseudomonas sp. (not *P. fluorescens*): brown eye, œil brun: on 5 PEI 57:80. Robinson et al. [895] considered the disease identical with "pink eye" on tubers of 5 from NS. They showed that its occurrence was highly correlated with the incidence of verticillium wilt (q.v.). Evidence was obtained that the disease was incited by a soil-inhabiting species of *Pseudomonas*.

P. ?fluorescens (Flügge) Migula: storage rot, pourriture d'entrepot: The organism was isolated from tubers of 5 from Newmarket, Ont. The rot was the most extensive at 5 C. The bacterium rapidly lost its pathogenicity [322].

Pythium spp., mainly *P. ultimum* Trow: leak or seed-piece decay, pourriture aqueuse ou pourriture pythienne du planton: on 5 BC 31:50, 32:50, [535], Alta 43:15, Man 38:54, Ont 48:59, Que 44:63, PEI 50:74. The disease is of minor importance although occasionally losses are heavy, e.g., leak in early crops was estimated to have destroyed 30 tons of potatoes valued at \$1,200 in 1955 in BC, 55:80. Jones [532] described the disease as it occurred in BC in 1930. The fungus was found in tubers after harvesting and in storage, and in cut sets after planting in the spring. When sets were allowed to form a callus before planting infection was reduced. Newton and Lines [787] reported that of the materials tested, dusting the freshly cut sets with ferbam (Fermate) was the most effective in preventing premature rotting of the sets.

Rhizoctonia crocorum (Pers.) DC. ex Fr.: violet root rot, rhizoctone violet: on 5 BC 41:47, [535], Alta 37:37, Sask 31:46, [93, p. 125], Ont 52:64, 55:80; a minor disease of potato.

Sclerotinia sclerotiorum (Lib.) de Bary: sclerotinia stalk rot, pourriture sclérotique: on 5 BC 39:58, Alta 38:54, Ont 51:68, Que NB PEI 24:40, NS 39:58, Nfld 62:62. Occasionally tubers in storage are

affected. The disease has been reported mostly from coastal BC and the Atlantic Provinces.

Spongospora subterranea (Wallr.) Lagerh.: powdery scab, gale poudreuse: on 5 BC Alta Ont-PEI 24:41, Nfld 52:64. Güssow [386] believed that the fungus was well established in some counties of Que in 1912 and was also present here and there in Alta Ont NB NS and Nfld. The disease is most prevalent in coastal BC, the Atlantic Provinces and Que. The most severe recorded outbreak occurred in BC; powdery scab reduced the value of a 200-ton crop by \$4,000-5,000, 46:51.

Ledingham [593] reported the occurrence of zoosporangia of *S. subterranea* on the roots of young plants of potato and tomato. Root nodules caused by the organism were observed in potted potato plants in the greenhouse BC 55:80, [535].

Streptomyces scabies (Thaxt.) Waks. & Henrici (*Actinomyces* s. (Thaxt.) Güssow): common scab, gale commun: on tubers of 5 BC-PEI 24:41, BC [535], Yukon 52:65, Nfld 49:xviii. Scab is generally prevalent, but the number of severe infections is not great, 24:41. The disease is most prevalent when the weather is dry during tuber formation. It is probably most prevalent in the Prairie Provinces. Heavy applications of lime in preceding seasons or barnyard manure in the current season enhance severe scab Que 42:53. Application of mussel mud PEI 24:41, or burning straw piles in the field NB 45:62, may also increase scab. Smooth-skinned cultivars are most affected, but the rough-skinned Nette Gem may occasionally be attacked Alta 40:43.

Sanford [922] found *Streptomyces* to be very abundant in Alta soils. In such soils moisture is the main factor controlling the development of scab. Abundant scab developed at a pH of 6 to 7 in dry soils, whereas soils sufficiently moist produced almost clean tubers. Tubers were most susceptible to infection during the first 10 days of tuber growth, before they reached a diameter of 0.5 inch [923]. In Irish Cobbler this period was 40-50 days after planting. These observations were later confirmed by a detailed study of the organism in culture [924]. He observed no benefit from adding green rye plants to the soil for the control of scab. Rouatt and Atkinson [904] recorded a marked reduction in scab by incorporation of a cover crop of soybean, whereas rye and clover effected little change.

Seed treatment was generally recommended for the control of scab and other diseases [757], but as a result of a field study, Sanford [926] showed that the disinfectants usually recommended produced no perceptible decrease in the amount of scab and planting very scabby untreated sets did not cause any increase of scab on the new crop. He demonstrated further that infection arose from colonies of the organism already in the soil. Busch [153] obtained promising results with a urea-formaldehyde (UFC-85) drench applied to the soil.

Barker and Page [99] reported the inception of scab lesions on potato tubers cultured aseptically in vitro when the tubers were inoculated with a suspension of *S. scabies* in sterile distilled water. However, Lawrence and Barker [586] found that no scab developed on the tubers without first subjecting them to some form of physiological wounding such as washing the tubers in distilled water or methanol before inoculation. They suggest that with refinement the technique may be useful in assessing scab resistance.

In Ont, on farms where scab was severe, there was a real need for resistant cultivars. Among the resistant ones developed in the US, Ontario came to be widely grown, 50:75, 52:65. Ontario and

Cherokee, another resistant cultivar, showed some infection only under extreme heat and drought, 55:81. Huron, developed in Canada from a cross of the German cultivar Hindenburg and Sebago, showed moderate resistance to scab and was otherwise suitable except that it matured late, similar to its German parent [529]. Avon is reported to be moderately resistant and although the tops mature late it produced a crop of uniformly sized tubers early in the season.

To obtain a source of resistance combined with earliness, crosses were made between the scab-resistant 6 and the early maturing 10. Selections that were both early and scab resistant were obtained [261]. These selections must now be crossed with cultivars of *S. tuberosum*.

Methods of isolating actinomycetes from scab lesions and soil are described [583]. The isolation of an actinophage that appears to be more active against scab-producing strains of *S. scabies* than against other isolates is reported [765].

Synchytrium endobioticum (Schilb.) Perc.: wart, tumeur verruqueuse: on 5 NS 41:48, Nfld 49:xv, Labr 63:98. Potato wart was first found in Nfld in 1909. Olsen [801] notes that the disease is widespread in Nfld and also occurs in Labr. The most popular cultivars are highly susceptible and heavy losses occur, especially in small cult. patches, where potatoes are grown continuously or alternated with cabbage and turnips. In 1949 all cultivars currently grown in Nfld except Sebago were susceptible, 49:xv. Since then several cultivars were found to be highly resistant. Rainfall greatly influences the severity of infection [801]. Olsen and Nelson [803] obtained clear indication that at least two physiologic races of *S. endobioticum* occur in Nfld. The principal race in Nfld is distinct because it attacks a number of cultivars that are immune to biotype 1 in Europe and Great Britain, but there also occurs a race not unlike biotype 1. The authors [804] have developed methods of estimating the numbers of resting sporangia in infested soil. Since wart was first discovered in Nfld, a quarantine has been in effect against the movement of potatoes from the island to the mainland of Canada.

As a result of a poor potato harvest in 1911, a large volume of potatoes was imported into Canada in the fall and winter of 1911-12 [387]. Because of the danger of introducing wart in potatoes imported from Europe, an Order in Council was passed in May 1912, making illegal the disposal or use for seed of potatoes imported from Europe [385, 438]. Wart was discovered in a shipment of potatoes imported from Liverpool, England, the principal port from which the potatoes were coming. In September 1912, the importation of potatoes from Europe was prohibited. Precautions taken at the time prevented the disease from becoming established on the mainland of Canada. After wart was discovered in a garden at Halifax, NS, a strict local quarantine against growing potatoes has so far prevented any further spread.

Verticillium spp. (*V. albo-atrum* Reinke & Berth. and *V. dahliae* Kleb.): verticillium wilt, flétrissure verticillienne: on 1a BC 44:46, Ont 29:29, 31:39, 47:50, NS 32:38; on 5 BC NB 42:59, Sask 38:47, Man 34:44, Ont 51:70, Que 49:64, NS 40:48, PEI 38:47.

Verticillium wilt is a destructive disease in Canada wherever eggplant is grown extensively. It caused heavy to complete loss of the crop in recent years in the Harrow-Leamington area, Ont, where *V. dahliae* appears to be the pathogen. When low or intermediate levels of *Verticillium* inoculum were present in the soil, the incidence of wilt increased in the presence of *Pratylenchus penetrans*

(q.v.). The nematode alone had no adverse effect on the roots or growth of the eggplant [704]. The addition of *V. dahliae* to field soil heavily infested with *P. penetrans* increased the relative rate of reproduction of the nematode in the roots of eggplant and tomato, but not pepper. The reasons for this difference were not established [750].

For many years verticillium wilt of potato was not distinguished from fusarium wilt. When the disease was recognized to be caused by a species of *Verticillium*, the organism was identified as *V. albo-atrum* without comment.

Robinson et al. [895] provided criteria by which the two species may be distinguished. The low temperature requirements and the dark mycelial growth of *V. albo-atrum* after 4 weeks serve to separate it from *V. dahliae*; the latter is characterized by the presence of pseudosclerotia in culture and the higher temperatures tolerated by the organism. They report isolates of *V. albo-atrum* from 5 from Sask, Ont NS and PEI, and *V. dahliae* from BC and Que; the latter was the predominant species in Oregon and Idaho. Some white variants of both species were encountered. When an isolate of *V. albo-atrum* from PEI was used for inoculum, Irish Cobbler and Kennebec were susceptible, Houma and Russet Burbank were resistant, and Ontario and Houma were symptomless carriers. To most isolates, eggplant and cotton were highly susceptible, whereas cucumber, tomato and potato were moderately susceptible. To an isolate of *V. dahliae* from BC, eggplant and cotton were highly susceptible, whereas cucumber, tomato and potato were unaffected. However, strains of *V. dahliae* highly pathogenic to *Lycopersicum* (q.v.) are known in BC [256] and Ont [690].

Berkeley et al. [77] clearly distinguished between *V. albo-atrum* and *V. dahliae*. *V. albo-atrum* was isolated from 5 from n. Ont and *V. dahliae* from a number of hosts including 5 from the US. McKen [690] isolated what appears to be *V. albo-atrum* sensu stricto from 1a, 5, *Lycopersicum* and other hosts in Ont. Verticillium wilt was epidemic in the Niagara Peninsula in 1940; in one nursery over 50% of the barberry and rose bushes were infected and many were killed. From his study of soil temperature and moisture, he concluded that serious outbreaks of verticillium wilt are relatively infrequent in the Niagara Peninsula because soil moisture is usually low when soil temperatures are high enough to favor the fungus.

Ayers and Hurst [33] reported that verticillium wilt caused by *V. albo-atrum* became increasingly prevalent in Irish Cobbler in PEI. The disease reduced the yield of marketable tubers. The main source of infection appeared to be infected tubers of the previous crop. Treatment of the cut sets with Semesan Bel, an organic mercurial, greatly reduced the incidence of wilt PEI 39:52. Robinson and Ayers [891] showed that a much higher incidence of wilt was obtained from noninfected, surface-inoculated seed than from infected, noninoculated seed. The degree of susceptibility of a cultivar to wilt is reflected in the extent that the fungus invades tubers and stalks. Vascular invasion is necessary for the development of wilt; it is apparently of minor importance in the perpetuation of the disease. Sanitation and seed treatment designed to lessen external inoculum is of prime importance in the control of verticillium wilt in potato. Of the fungicides tested Semesan Bel was the best all-round seed treatment chemical [892]. Different cultivars differ greatly in their susceptibility to *V. albo-atrum* [31, 32].

Alfalfa mosaic virus (solanum virus 10): calico, calicot: on 5 BC Ont 53:75, Sask 45:70, NB 43:66, PEI

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44:64, Nfld 57:76. MacLeod [661] gives a description of strains of AMV that attack potato.

Aster yellows virus: aster yellows, jaunisse de l'aster: on 1a NS 61:69.

Aster yellows virus: bunch or purple top, touffe pourpre: on 5 BC 39:56, Alta 37:38, Alta to n.w. Ont 38:51, Ont 43:67, Que 44:66, NB PEI 39:56, NS 42:61, Nfld 50:76. In 1942 purple top was prevalent on potatoes in the Maritime Provinces, particularly PEI, 42:61, whereas aster yellows was reported to be very destructive to carrots in NB and NS. Tubers from affected plants are often flabby. When such tubers were planted in 1943, many failed to sprout and misses were prevalent in fields of Katahdin and Green Mountain PEI 43:67. MacLeod, 45:73, reported that the virus could not be found in tubers or plants beyond the second generation from the original diseased clones; cf. BC 52:58. The disease was unusually prevalent in Alta, Sask and Man in 1944, 44:66.

The secondary or haywire stage was found in Green Mountain, Katahdin and Sebago fields NB 48:62. MacLeod, 49:66, reported the successful transmission of the virus from *Asclepias syriaca* to tomato by means of dodder. The virus was also transmitted from diseased potato to healthy seedlings and to *Datura stramonium*, *Nicotiana rustica* and tomato by grafting, 43:67. MacLeod recognized that late leaf roll, which he originally described as a distinct virus disease, 47:69, was the early stage of purple top, 52:68. It seems probable that purple dwarf, nanisme pourpre, so named by Sanford, 40:49, for a disease in Alta, is a strain of the same virus, which results in somewhat different symptoms [Chiykowski in litt.]. The latter may also have been called haywire BC 57:80, Alta 42:60, 53:76.

Beet curly top virus: curly top, frisolée de la betterave: on 5 BC 39:58, Que 63:98; the latter report seems in error. See *Lycopersicum*.

Potato leaf roll virus (solanum virus 14): leaf roll, enroulement: on 5 BC-PEI 24:42; on 9 NB 43:66. According to Murphy [757] leaf roll was a comparatively new disease in Canada before 1921. As the yield of affected plants is about one third of the healthy, it was estimated that it was then causing a loss of 10% of the crop in s. Ont; on the other hand, in the Maritime Provinces and Que the crops were practically free from the disease. Murphy and Wortley [758] confirmed the work of Quanjer, who observed that leaf roll was transmitted to healthy plants growing in close proximity to diseased ones. Murphy [757] noted that cultivars differ in susceptibility. More important, the rate of spread varied greatly in different parts of Canada. Where spread was slight, he believed that the disease could be rapidly eliminated if hill selection was practised. He recommended that growers in the best districts of the Maritime Provinces, Que and n. Ont grow their own seed in an isolated plot, spray once a week, and remove any plants showing disease as soon as observed.

When the debilitating effect of leaf roll on potato production was realized growers of seed potatoes sought to have their crops inspected for freedom from this and other diseases. The Potato Certification Service arose in the first instance to certify, by inspection of the tubers, their freedom from powdery scab (q.v.) in shipments to the US. As mentioned already, an equally important reason was to certify, by field inspection of the crop, its freedom from leaf roll and other virus diseases. At the time the Service was of particular interest to growers of Garnet Chili seed potatoes grown for export to Bermuda. The history of potato inspection for the first 6 years, 1915-1920, and the regulations

governing certification after 6 years of operations have been recorded [390]. In 1920, the acreage entered for certification was over 7,500 acres of which only 52%, or under 4,000 acres, passed. Over the years both acreage entered and passed has steadily risen. Both reached a peak in 1949 and 1950, when over 70,000 acres were entered and over 60,000 passed inspection. The acreage then declined; in 1962, 60,000 acres were entered and nearly 50,000 passed. Seed potato certification is important in maintaining a supply of high-quality seed for domestic use, and, also, certified seed is a valuable export. Of the 9,000,000 cwt. produced each year, about 3,000,000 are exported, 2,000,000 are sold for seed in Canada and the surplus 4,000,000 are sold as table stock.

Sanford and Grimble [941] presented evidence that phloem necrosis of the tubers may result from causes other than infection by PLRV. However, phloem necrosis appears to be a shock symptom of healthy plants to current season infection by the virus. Davidson [244] found that nonviruliferous *Myzus persicae* (Sulz.) failed to produce phloem necrosis of the tubers when caged on healthy potato vines, whereas viruliferous colonies caused severe phloem necrosis. When these tubers were planted they produced leaf roll infected plants. On graft inoculation [245], leaf roll symptoms were regularly severe on young plants and a high percentage became infected. Severity of foliage symptoms and the percentage of plants that showed infection declined gradually until 15 August. After this date any infected plants were healthy in appearance. Probably most plants that show symptoms of leaf roll in the field in Alta are from tubers of plants infected the previous year.

McCarthy [627] considered leaf roll the most important and costly virus disease of potato, a disease most difficult to avoid or eliminate. He confirmed the work of previous workers, viz., the green peach aphid, *Myzus persicae*, is the main vector of PLRV, and provided further proof that *Physalis floridana* Rydb. is a reliable indicator. Of the several potato cultivars used as a source of the virus, Netted Gem was the most reliable. Wright and McCarthy [1189] found that Kennebec was more tolerant to leaf roll than Netted Gem, Sebago, White Rose or Fundy. To detect infection by strains of PLRV other than the most severe, special indexing methods are required, such as the use of *Physalis floridana* as a test plant. McCarthy [628] noted that when potato plants exhibiting mild, moderate or severe symptoms were used as sources of inoculum, the symptoms produced in the test plants varied from mild to very severe, irrespective of the symptoms in the original host. Thus, if strains exist, they were unusually difficult to separate. No simple explanation of the variability of symptoms is yet possible.

Leaf roll has been a problem in BC from about 1950 and in 1957-59 many crops of Netted Gem table stock were unfit for sale because of net necrosis in the tubers, 57:76, 58:72, 59:61. The introduction of Kennebec, which is tolerant to leaf roll infection and is resistant to the net necrosis phase, into the seed-producing areas has been suggested as the cause of the disease in Netted Gem.

MacKinnon [645] compared the aphid transmission of PLRV and latent turnip virus, two persistent viruses, using *Physalis floridana* as an indicator plant. In a study of virus movement in *P. floridana*, MacKinnon and Clark [649] observed no symptoms of PLRV in the first 6 days after inoculation; then 86% of the plants showed symptoms in the second week, 11% in the third and 3% in the fourth.

PLRV moves more rapidly than LTV; the factors for this difference are discussed; [cf. 645].

MacKinnon [641] reported that PLRV did not move out of inoculated leaves of 5 within 6 hours, but moved out of some leaves in 24 hours. Previously Bradley and Gagnon [118] found that it took 5 to 8 days for PLRV to pass from viruliferous *Myzus persicae* on the leaves of Katahdin into the tubers. After 20 days nearly all the eyes of the tubers produced plants affected by PLRV. MacKinnon [644] observed that rearing aphids on different host species affected the subsequent transmission of persistent viruses. Also, in comparing the efficiency of aphids as vectors of a virus, whether or not these hosts are infected with other unrelated viruses should be considered.

MacKinnon [642] reported that when single aphids of *M. persicae* were reared on plants affected by PLRV those that acquired the virus subsequently acquired turnip latent virus as readily as did other aphids raised on healthy plants. The reverse order of acquisition had no effect. Furthermore, when aphids fed on plants affected with both viruses, each aphid acquired and transmitted either virus independently of the other. Disturbing nymphs of *M. persicae* before acquisition or during inoculation feeding had no effect on transmission, but disturbing them during short acquisition feedings reduced transmission [647]. A 6- or 18-hour inoculation feeding was about equally effective, but a latent period of more than a day is required before young aphids are able to transmit PLRV.

Exposure of potato seedlings to natural infection by PLRV in the field and artificial inoculation by aphids in the greenhouse in a 5-year period revealed that seedling F4896 was the most resistant of 132 seedlings tested. Most seedlings became infected in the first year or two. Although F4896 was resistant to aphid inoculation, it could be infected by grafting. As yet no seedling with resistance to leaf roll has been produced with sufficient horticultural quality to be released [651].

Some 30 of 60 clones from 35 tuber-bearing *Solanum* species did not become infected by PLRV when viruliferous aphids were placed on them. Clones that were unfavorable food plants for aphids were less likely to become infected than those that were favorable or tolerant [646].

Potato mosaic and streak viruses: mosaic and streak, mosaïque et bigarrure: From the Survey records it is rarely possible to identify even approximately the particular viruses present. For characterization of these viruses and the symptoms that they separately or in combination produce in cultivars of 5 the reader is referred to a recent summary by MacLeod [661]. The viruses that may be treated under the above heading are potato viruses A, F, M, S, X and Y.

Mosaic is reported in 5 in every province BC to PEI, 24:41, and Nfld, 49:xix. It is also recorded in varying amounts every year. Mosaic is often the main cause of rejection of fields of potatoes entered for certification NB 29:34.

Murphy [757] gave a good early account of mosaic as it occurred in Canada. He found that yields of affected plants were reduced by 25-30%. Cultivars differed greatly in susceptibility; of the two leading cultivars in the Maritime Provinces, Green Mountain showed 22.4% infection and Irish Cobbler 2.3%. In 1921 in E. Canada, some fields of seed potatoes were free from mosaic only in PEI and in the counties of NB bordering the Gulf of St. Lawrence. Spread may be rapid once mosaic was introduced. High temperatures tended to suppress symptoms of the disease. Murphy recommended

isolation, insect control, and careful early roguing as probably the best means of control. These principles are the basis for the production of certified seed potatoes. Some further improvement in controlling the disease was obtained by planting the seed plot in tuber units PEI 36:36, or by planting the seed plot with greenhouse-indexed tubers NS 44:65. Freedom of the original seed from mosaic appeared to be a more important factor than the aphid population in reducing the incidence of mosaic Que 45:71.

In 1939, MacLeod, 39:69, reported several strains of potato virus X, to use modern usage, and of virus Y, as well as virus A from commercial cultivars from Alta, Ont and NB PEI, and virus M in King Edward from Ont and NB. In 1940, 40:63, he noted that Katahdin and Chippewa, which were then relatively new cultivars, were not resistant to virus X and were gradually acquiring the virus. Weak symptomless strains protected the cultivars from necrotic strains. Stocks not so protected would in time be eliminated.

Potato virus A (solanum virus 3): faint mosaic, mosaïque voilée: on 5 NB 39:69, 51:71. Bagnall, 52:67, showed that many Canadian and American cultivars are susceptible to this aphid-transmitted virus. However, Canso, Irish Cobbler and Mesaba react to infection by virus A with acronecrosis, nécrose apicale, and are therefore extremely resistant under field conditions, 52:67. In an early study [40] Katahdin did not become infected with virus A during a 2-year field exposure or exposure in the greenhouse to viruliferous *Myzus persicae*. The cultivar was resistant but not immune to virus A upon sap inoculation. It was readily infected by grafting, but the plants were practically symptomless. It developed a mosaic when virus X was also present. Later the authors [648] succeeded in transmitting virus A to greenhouse-grown Katahdin by *M. persicae*; the circumstances are described in some detail. However, Katahdin is highly resistant to virus A.

Potato viruses A and X: mild mosaic, mosaïque benigne: Bagnall, 52:67, reported mild mosaic in a number of cultivars in NB.

Potato viruses A, X and Y: crinkle mosaic, mosaïque gaufrée: on 5 NB 48:62 et seq.

Potato virus F or potato aucuba mosaic virus: aucuba mosaic, mosaïque aucuba: on 5 Que 50:76, NB 39:72, 45:71, 49:66. Munro [754] showed that 11 is a good indicator for the virus, which is often symptomless in some cultivars. Bagnall [36] reported that virus F was latent in the Dutch cultivar, Albion, and that interspecific potato hybrid F451 was resistant to the virus.

Potato viruses M, S and X: interveinal mosaic, mosaïque internervale: Bagnall, 56:80, found that interveinal mosaic in Irish Cobbler and other American cultivars is caused by these three viruses. The separation of each virus from the others is described and the presence of all three proven serologically. Viruses M and S showed slight serological relationship.

Potato viruses M, S and X: leafrolling mosaic, mosaïque-enroulement: The disease was originally attributed to solanum virus 11 in Green Mountain in NB, 47:70, et seq., 51:71. Bagnall, 56:80, showed that viruses M, S and X are present. For a fuller account see Bagnall et al. [39].

Potato virus S: latent disease, maladie latente: Munro, 54:88, reported the detection of virus S at Fredericton, NB, in Green Mountain by using virus S antiserum obtained from the Netherlands. Bagnall, 55:85, found virus S to be widespread in Canadian and American cultivars; however, some stocks of a few cultivars were free from the virus. Virus S

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rivals virus X as the most widespread among the potato viruses, 56:80. Numerous older cultivars appear to be entirely infected by viruses S and X; [cf. 37].

Potato virus X (solanum virus 1): mosaic, mosaïque: MacKinnon and Munro [650] observed that virus X moved more rapidly into the tubers of Keswick than into those of Canso and Katahdin. In partly infected tubers of Keswick the virus was found more often in eyes from the eye end than elsewhere in the tuber, but in the two other cultivars, the location of the eye had no apparent effect. Little or no movement of the virus occurred during storage. In chronically infected Green Mountain, virus X was detected in every tuber, but not always in every part. The virus was found most often in the eyes and sprouts. Again there was no evidence of movement of virus in the tuber during storage, but high virus concentration in the sprouts apparently resulted from local multiplication [643].

Bradley [109] described a rapid method of testing potato plants in the field for the presence of virus X by using the serological precipitin reaction.

Potato virus X, D strain (solanum virus 6): foliar necrosis, nécrose foliaire: on 5 NB 49:64 et seq.: apparently uncommon.

Potato virus X, necrotic strain: leaf streak, bigarrure: Traces were reported in relatively new cultivars or seedlings NB 47:70 et seq. Bagnall, 57:79, reported the finding of two distinct strains of virus X in Irish Cobbler, which had a marked effect on the maturity and the yielding ability of the affected plants.

Potato virus X, S strain: mild mosaic, mosaïque bénigne: on 5 NB 47:70 et seq.

Potato viruses X and Y: rugose mosaic, mosaïque rugueuse: on 5 NB 47:70 et seq.

Potato virus Y (solanum virus 2): leaf-drop streak, etc., bigarrure-affaïssement; Bradley and his associates have studied the transmission of virus Y by different aphids, particularly the conditions when *Myzus persicae* was the vector. Successful transmissions of the virus in tobacco by single aphids of *Myzus persicae* (Sulz.), *Aphis abbreviata* Patch [*A. nasturtii* Kltb.], *Macrosiphum solanifolii* (Ashm.) [*M. euphorbiae* (Thomas)], and *Myzus solani* (Kltb.) were 55, 31, 9 and 4% respectively. When single infective aphids were transferred to a series of five plants at 5-min intervals, *M. persicae* caused more infections and remained infective longer than *A. abbreviata* [120]. Later, *Myzus certus* (Wlk.) was found to be as efficient as *M. persicae* in transmitting virus Y. *M. certus* was found feeding on potatoes under glass; its normal hosts in N. America are pansy and *Capsella bursa-pastoris* [630].

Myzus persicae may cease to be infective with virus Y within minutes and is always noninfective within hours after leaving infected plants. Transmission rarely occurred if feeding punctures lasted 10 min and none occurred after 20 min. During brief feeding punctures the stylets are inserted into the epidermis only and little or no saliva is ejected [110, 111]. Insertion of a membrane between a feeding aphid and the plant leaf greatly impeded the acquisition or transmission of virus Y. Aphids did not become infected when they penetrated the deeper tissues of infected plants that had the virus in the superficial tissues inactivated by UV irradiation. Thus, *M. persicae* rarely becomes infective with virus Y or transmits it after the stylets penetrate beyond the first layer of plant cells [113].

M. persicae infective with virus Y were made noninfective by exposing the tips of the stylets to UV irradiation. After an hour irradiated aphids

acquired the virus as readily as nonirradiated aphids. Thus, only virus near the tips of the stylets appears to be transmitted [112, 116]. Virus Y was made noninfective by incubation with formaldehyde in vitro, but the noninfective virus reacted with virus Y serum and caused antibodies in rabbits as readily as infective virus Y. Individual infective *M. persicae* were made noninfective when the tip of the stylets were bared and treated with formaldehyde, whereas aphids remained infective if the stylets remained enclosed in the labium [117]. UV irradiation of plants soon after inoculation stopped infection or, if done before inoculation, reduced their susceptibility. Trichothecin reduced infection by over 50% when sprayed on plants 2 days before or 4 hours after they were inoculated by an infective aphid [118]. Acquisition or transmission of virus Y was impeded by treating leaves with a light paraffin oil. The results suggest that oil may be used in the field to prevent spread of certain aphid-borne viruses [114].

Bradley and MacKinnon [119] reported that aphids transmit cucumber mosaic, potato Y and tobacco etch viruses most readily when the insects probe superficially first the infected and then susceptible plants and they cease to transmit the virus soon after they leave the source. Trichothecin prevented most systemic infections of these viruses except CMV. It also prevented scarcely any infections of the persistent virus PLRV when the plants were sprayed before or after the aphids were placed on them.

Bagnall and Bradley [38] found that potato cultivars that reacted with necrosis to the strain of virus Y commonly found in E. Canada were resistant in the field under normal conditions of spread in susceptible cultivars. In cultivars that reacted with necrosis the virus appeared to be self-eliminating. Such cultivars are Katahdin, Kennebec and Warba and on the basis of the necrotic type of reaction several other cultivars may be field resistant. The authors advocate that no susceptible cultivar be released if its field reaction is so mild as to make roguing difficult.

Potato spindle tuber virus: spindle tuber, filosité des tubercules: on 5 BC 28:80, Alta 38:49, Sask 37:40, Man PEI 31:48, Ont 40:49, Que 34:42, NB 24:42, NS 39:54, Nfld 50:80. The incidence of spindle tuber began to cause concern in PEI from 1950 on, when the number of fields rejected for certification varied from 21 to 83. As a result of a special survey in 1956, MacLachlan, 56:72, reported spindle tuber in small amounts in most commercial fields in PEI and in some fields, chiefly of Sebago, 15-30% of the plants were affected. MacLachlan [653] reported that in experiments in the greenhouse, no symptoms that could be interpreted as due to PSTV were observed on the foliage or tubers of Kennebec, Sebago, Irish Cobbler or Green Mountain. When plants from spindled tubers were grafted on Seedling 41956, two types of symptoms developed in the Seedling, neither resembling spindle tuber infection. More recently Raymer and O'Brien [868] showed that PSTV could be transmitted to tomato by grafting and sap inoculation, and Whitney and Peterson [1165] reported on an improved technique for inducing diagnostic symptoms of the virus in tomato.

Potato witches'-broom virus: witches'-broom, virose-balai de sorcière: on 5 BC Ont 24:42, Alta 32:47, Sask Man NB PEI 31:48, NS 26:26. Witches'-broom is the principal virus disease of White Rose and Netted Gem in the Cariboo district, BC, 46:56, where a 15% infection was noted as a result of the previous year's infection, 47:71. It also occurs in central BC and n. Alta, 52:69. MacLeod confirmed the occur-

rence of the disease in Ont NB, 44:67, NB, 47:71, 49:67, PEI, 50:31.

Wright [1186] distinguished two strains of PWBV by the symptoms on tomato. In the field symptoms may appear by mid-summer as a result of natural infection in the current season, but many plants remain symptomless. The disease was evident in the symptomless plants only when the tubers were grown the next season. Later, he [1187] recognized a third strain. Of 13 sources tested, 9 caused a disease on tomato with symptoms similar to those described by previous workers.

Potato yellow dwarf virus: yellow dwarf, nanisme jaune: on 5 BC Alta, 39:55, probably from infected seed; Ont 37:39, although first noted in 1933; Que 38:49, NB 49:68. A current season infection was associated with the occurrence of the clover leafhopper, *Aceratagellia sanguinolenta* (Provanch.), in an adjacent red clover field Ont 44:50. The disease appears to be of minor importance. See MacLeod [661] for a description of the disease.

Chemical injury: to seed pieces of 5: borax, PEI 37:40; fertilizer, Ont 45:75, Que 47:72, PEI 34:45, Nfld 50:81; mercuric chloride, PEI 31:50. To tubers: common salt, Sask Que 43:68; a copper salt, NB 46:54; potash, PEI 36:37; fumigation with chloropicrin, Ont 47:72. To foliage: 2,4-D, Man 53:79.

Enzymatic reaction, réaction enzymatique: blue spotting, tacheture bleue: in tubers of 5 BC 57:80. The disorder was most prevalent in tubers from farms where soil moisture was deficient during the latter part of the growing season; the symptoms and nature of the disorder are discussed by Wright [1188].

Boron deficiency, carence de bore: on 5 NB; Katahdin apparently is very sensitive to boron deficiency, 42:62.

Magnesium deficiency, carence de magnésie: marginal and interveinal chlorosis, chlorose marginale et internervale: on 5 Que 57:81, NB 33:34, NS 48:64, PEI 34:45, Nfld 58:75. Taylor and Howatt [1067] described the symptoms on potato. They found that the disorder may be corrected by spraying the crop with magnesium sulphate or adding a magnesium salt to the fertilizer.

Nitrogen deficiency, carence d'azote: leaf yellowing, pâleur des feuilles: on 5 PEI 48:64. This single record is no measure of the frequent lack of nitrogen.

Oxygen deficiency, carence d'oxygène: black heart, cœur noir: in tubers of 5 BC 54:90, [535], Sask 43:68, Ont 38:53, Que 50:81, NS 47:72, PEI 42:62.

Potassium deficiency, carence de potasse: bronzing, bronze ou pyrolyse: on 5 Man 24:43, NB 30:48, PEI 38:54.

Excess moisture, humidité excessive: enlarged lenticels, hypertrophie des lenticelles: on tubers of 5 in soil BC [535], Sask 33:34, Ont 56:83, Que 30:81; or in damp storage PEI 44:68.

Improper growing conditions, déséquilibre végétatif: growth cracks, crevasse de croissance: on tubers of 5 PEI 51:73, 55:86.

Improper water relations, déséquilibre hydrique: (a) oedema, œdème: on 3 in greenhouse Alta 35:19; (b) hollow heart, cœur creux: on tubers of 5 BC 38:53, [535], Man 42:63, Ont 54:91, Que 47:73; NB NS PEI 24:42; an occasional field severely affected.

Lightning injury: on 5 Ont 43:69, Que 47:73, NB 44:68, NS 50:82, PEI 34:45, Nfld 52:70.

Low temperature, basse température: frost injury and frost necrosis, gelure et nécrose de gelée: Damage from frost or low temperatures is not uncommon;

selected records from each province are: (a) frost injury, on foliage and tubers of 5 BC [535], Alta 34:45, 58:74, Sask 44:69, Ont PEI 29:35, Que 39:57, NB PEI 33:34, NS 45:75, Nfld 50:82; (b) frost necrosis of tubers, BC 49:68, [535], Sask 54:90, Man 55:85, Que 50:82, NB 44:69, PEI 29:35, Nfld 52:70; (c) injury from low but above-freezing temperatures, Ont NB PEI 44:69.

Manganese toxicity, toxicité de manganèse: stem streak necrosis, bigarrure-nécrose: on 5 Que 62:65, 63:100, PEI 54:92, 56:84. Robinson and Callbeck [893] state that this disorder occurs in PEI only on very acid soils and is probably the direct effect of manganese toxicity. A high level of NPK fertilizer was beneficial. Applications of lime markedly reduced but did not entirely prevent stem streak. Cultivars differ greatly in their susceptibility. Use of resistant cultivars accompanied by moderate applications of lime are suggested for its control.

Giant hill, butte géante: in 5 BC 29:36, [535], Alta 38:49, Man NS 39:54, Ont 47:72, Que 44:68, NB 33:32, PEI 35:37. Giant hill appears to be more prevalent in BC, n. Ont and Que than elsewhere. The condition has been attributed to genetic factors.

Internal brown spot or sprain, tacheture interne: in tubers of 5 BC 38:53, [535], Sask 43:69, Ont 53:78, NB 44:70, PEI 40:50; in some instances the disorder was attributed to dry soil conditions.

Measles, rougeole: on tubers of 5 BC 52:71, 55:86; the cause of the disorder is unknown.

Potato wilding, sauvageon de pomme de terre: on 5 PEI 61:81. Potato wildings are somatic variations of the potato plant that are similar regardless of cultivar or geographic location. Wildings were identified in PEI and BC, where for several years they were considered to be manifestations of potato witches'-broom virus. The prominent terminal leaflets of wildings distinguish them from plants affected by PWBV. Both conditions are perpetuated by the tubers, but only the virus is transmitted by grafting [1190].

Sprout tubers, couveuse: on 5 BC 42:63, 51:74, [535], Man 40:50, Ont Que 52:71, NB 51:74, NS 42:63. The cultivars most frequently affected were Chippewa, Canso, Katahdin, Ontario and Sebago. Sets planted from warm storage into cold soil are prone to develop sprout tubers.

Solidago L.

COMPOSITAE

Perennial herbs mainly of N. America but also of S. America, Eurasia and the Azores.

1. *S. altissima* L.; in Canada in Que and Ont.
2. *S. bicolor* L., silverrod; in Canada in NS, NB, Que and Ont.
3. *S. caesia* L.; in Canada in Que and Ont.
4. *S. canadensis* L.; Nfld and NS to Que, Man and Sask. 4a, *S. c.* var. *gilvocanescens* Rydb. (*S. g.* (Rydb.) Smyth, *S. pruinosa* Greene); Sask.
5. *S. decumbens* Greene; Mack, Yukon and Sask to Wash, Ore and NM.
6. *S. dumetorum* Lunell; Sask.
7. *S. flexicaulis* L.; in Canada in NS and from Que to Ont.

Solidago

8. *S. gigantea* Ait.; PEI and NS to Ore. 8a, *S. g.* var. *leiophylla* Fern. (*S. serotina* Ait. non Retz.); NS and Que to BC.
9. *S. graminifolia* (L.) Salisb. (*S. lanceolata* auct.), poverty weed; NS and Que to Ont. 9a, *S. g.* var. *media* (Greene) Harris (*Euthamia camporum* Greene); Minn and south. 9b, *S. g.* var. *nuttallii* (Greene) Fern.; Nfld and NS to Minn.
10. *S. hispida* Muhl.; Nfld and NS to Man and Sask.
11. *S. juncea* Ait.; NS and NB to Sask.
12. *S. lepida* DC.; Labr, Nfld and Que to Alaska and BC. 12a, *S. l.* var. *elongata* (Nutt.) Fern.; Nfld, Que and Ont to BC. 12b, *S. l.* var. *fallax* Fern.; Nfld, Que and Ont.
13. *S. macrophylla* Pursh; Labr, Nfld and NS to Ont.
14. *S. missouriensis* Nutt.; BC. 14a, *S. m.* var. *fasciculata* Holzinger (*S. glaberrima* Martens); BC to Ore and Ont.
15. *S. mollis* Bartl.; in Canada in Man and Sask.
16. *S. multiradiata* Ait. (including *S. m.* var. *scopulorum* Gray); Labr, Nfld, NS and Que to Alaska.
17. *S. nemoralis* Ait.; PEI, NB, Que and Ont to Alta.
18. *S. patula* Muhl.; in Canada in s. Ont.
19. *S. puberula* Nutt.; in Canada in NS, PEI and Que.
20. *S. purshii* Porter (*S. humilis* Pursh); Labr, Nfld and Que to Man.
21. *S. racemosa* Greene; in Que and Ont. 21a, *S. r.* var. *gillmani* (Gray) Fern.; NB and Ont.
22. *S. randii* (Porter) Britt.; NS and Que.
23. *S. riddellii* Frank; Ont.
24. *S. rigida* L.; in Canada from Ont to Alta.
25. *S. rugosa* Mill.; Nfld and NS to Ont.
26. *S. sempervirens* L.; Nfld to Que.
27. *S. shortii* Torr. & Gray; Ky.
28. *S. speciosa* Nutt.; mainly e. US.
29. *S. squarrosa* Muhl.; NB, Que and Ont in Canada.
30. *S. uliginosa* Nutt.; in Canada from Nfld, NS, NB and Que to Ont.

Other host: 31, *S. glomerata* Michx.

Asteromyia spp.: the so-called *Phyllachora solidaginis* (Schw.) Sacc. on 4 Que 29:78, 9 PEI 25:81, [1138] and *Rhytisma solidaginis* Schw. on 9 Que 25:81 are the galls of these midges.

Cercospora cana Sacc.: on 4 Man [93, p. 115].

Coleosporium asterum (Diet.) Sacc. (*C. solidaginis* (Schw.) Thüm.): rust, rouille: II III on *S. spp.* NS Nfld F53:24; on 4, 7, 17, 18, 30 Ont, 14a Alta, 16 BC Man [13]; a very common rust on *S. spp.*, including species grown for ornament, Man 38:108 et seq.; in 1943 in the goldenrod plots at Ottawa, Ont, the following hosts were infected: 1, 3, 4, 8, 8a, 12, 12a, 12b, 15, 19, 21a, 23, 24, 25, 26, 27, 28, 31. Some species were highly resistant, with or without necrosis of the lesions, 43:24. On *S. sp.*, 16 Alaska [175]; on 4, 8a Sask Man, 4a, 16 Man [93, p. 63]; on 2, 4, 8a, 11, 25 NS [1138]; on 4 Man 34:110, Que 32:109, NB 31:125, NS PEI 25:81; on 4a Alta 24:61, Sask 34:100; on 6, 10, 29 Ont, 16 Que [828]; on 13 Que 33:123; on 14a Alta 24:61; on 17 Ont 33:123; on 19 NB 26:40; on 20 Que 32:109; on 23 Ont 34:110; on 25 Sask 32:109, Que 31:124; on 25 NB, 26 NS PEI [956].

C. delicatulum Hedgc. & Long: rust, rouille: on 9a, 9b Ont 43:25; on 9 NB (sub *C. solidaginis*) 26:40; on 9 Que F61:54.

Darluca filum (Biv.-Bern.) Cast.: on *Coleosporium asterum* on 25 Que 33:123.

Diaporthe arctii (Lasch) Nits.: on stems of *S. spp.* NS [1138].

D. linearis (Nees) Nits. and *D. quadruplex* Wehm.: on *S. spp.* NS [1138].

Erysiphe cichoracearum DC. ex Mérat (*E. communis* Wallr. ex Fr.): powdery mildew, blanc: on *S. spp.* Alaska [175], BC [50], Sask [93, p. 44], Ont 31:125, Que 44:117, 52:120, PEI 32:109; on *S. sp.* NS PEI, 7 NS [1138]; on 25 Que 32:109.

Leptosphaeria doliolum (Pers.) de Not.: on *S. spp.* NS [1138].

L. ogilviensis (Berk. & Br.) Ces. & de Not. and *L. planiuscula* (Riess) Ces. & de Not.: on stems of *S. spp.* NS [1138].

L. vagabunda Sacc.: on *S. sp.* NS [1138].

Mycosphaerella tassiana (de Not.) Johans.: on 16 BC [50].

M. virgaureae Krieg.: on stems of *S. sp.* NS [1138].

Ophiobolus fulgidus (Cke. & Pk.) Sacc.: on dead stems of *S. spp.* Man [93, p. 55].

Pleospora chlamydospora Sacc. var. *c.* (*P. balsamorhizae* Tracy & Earle): on 5 BC [50].

Puccinia dioicae P. Magn. (*P. asterum* Kern, *P. extensicola* Plowr. var. *euthamiae* Arth. and var. *solidaginis* (Schw.) Arth.): rust, rouille: 0 I on *S. sp.* Ont 31:125; on *S. sp.*, 1, 4, 9, 19, 25 NS [1138]; on 1, 4, 7, 8a, 9 Ont, 25 Que [13]; on 4a Man, 13, 25 Que 33:123; on 8a Sask Man, 17, 24 Man [93, p. 68]; on 12 BC [1198]; on 14a Alta 24:61, [cf. 15, p. 198].

P. grindeliae Pk.: 0 I on *S. sp.* NS [1138; cf. 15, p. 141].

P. stipae Arth.: 0 I on *S. spp.*, 24 Sask [93, p. 71]; on 14a, 15 Alta [15, p. 140]; on 17, 24 Alta 24:61; on 17 Man 33:123.

P. virgae-aureae (DC.) Lib.: III on *S. sp.* Alaska [175]; on 9 Ont [828]; on 19 NS [15, p. 202]; ? on 22 Que 32:109.

Pyrenopeziza artemisiae (Lasch) Rehm and *P. a.* var. *solidaginis* Rehm: on stems of *S. sp.* NS [1138].

Ramularia virgaureae Thüm.: on leaves of 4a, 10 Man [93, p. 125].

Rhabdospora solidaginis (Cke. & Ell.) Sacc.: on stems and insect galls on *S. sp.* Sask Man [93, p. 136].

R. subgrisea Pk.: on stems of *S. sp.* Man [93].

Septoria solidaginicola Pk.: on *S. sp.* Man 38:108; on 8a, 24 Man [93, p. 139].

Uromyces perigynius Halst.: 0 I on *S. spp.*, 2 NS; also 8, 25 infected experimentally [1138; cf. 15, p. 200].
U. sommerfeltii Hyl., Jørstad & Nannf. (*U. solidaginis* (Sommerf.) Niessl): III on 12 BC [1198; cf. 15, p. 201].

Sonchus L.

COMPOSITAE

Coarse weeds of the Old World.

1. *S. arvensis* L., perennial sow thistle, chaudron jaune; a common weed in all provinces, particularly in the northerly agricultural districts from Que to Alta.
2. *S. oleracea* L., annual sow thistle, chaudron blanc; in all provinces but especially abundant in Que, Ont and BC.

Bremia lactucae Regel: on 2 NS [1138].

Fusarium oxysporum Schlecht.: from diseased roots of 1 Man [335].

Leptosphaeria doliolum (Pers.) de Not.: on dead stems of 1 Man [93, p. 54].

L. subconica (Cke. & Pk.) Sacc.: on dead stem of 2 Man [93].

Marssonina sonchi Dearn. & Bisby: on 1 Man Ont [93, p. 131].

Meloidogyne sp. (*Caconema radicola* (Greef) Cobb, *Heterodera marioni* (Cornu) Goodey): on 2 in greenhouse BC 32:110, and in a strawberry field BC 48:93.

Phiala cyathoidea Bull. ex Gill.: on old herbaceous stems of 1 Man [93, p. 41].

Rhizoctonia solani Kühn: on diseased roots of 1 Man [93, p. 125].

Sclerotinia sclerotiorum (Lib.) Sacc.: on 1 Man 24:82, [91], but not recorded in [93].

Sclerotium pdeciduum Davis: on old stems of 1 Man [93, p. 126].

Septoria sonchi-arvensis Dearn. & Bisby: common on 1 Sask Man Ont [93, p. 139].

S. sonchifolia Cke.: on 1 Man [93, p. 140].

Sporocybe tessulata Sacc.: on old stems of 1 Man [93, p. 127].

Aster yellows virus: aster yellows, jaunisse de l'aster: on 1 Man 33:123, NB 32:88.

Sorbaria A.Br.

ROSACEAE

Large deciduous trees of e. Asia.

1. *S. sorbifolia* (L.) A.Br.; n. and e. Asia.
- Septoria* sp.: leaf spot, tache septorienne: on 1 Man 45:121.

Sorbopyrus Schneid.

ROSACEAE

Hybrids between *Pyrus* and *Sorbus*.

1. \times *S. auricularia* (Knopp) Schneid. (*Pyrus communis* \times *Sorbus aria*); originated before 1620.

Taphrina bullata (Berk.) Tul.: leaf blister, cloque des feuilles: on 1 Saanichton, BC [535].

Sorbus L.

ROSACEAE

Deciduous trees or shrubs of N. America and Eurasia; some species cult. for ornament.

1. *S. alnifolia* (Sieb. & Zucc.) K.Koch; e. Asia.
2. *S. americana* Marsh (*Pyrus a.* (Marsh) DC.), mountain ash, maskonabina; in Canada from Nfld, NS and Que to Man.
3. *S. aria* (L.) Crantz; Europe.
4. *S. aucuparia* L. (*Pyrus a.* (L.) Gaertn.), rowan tree or European mountain ash, cormier; Europe; planted for ornament and locally naturalized Nfld and NS to BC and Alaska.
5. *S. decora* (Sarg.) Schneid. (*Pyrus d.* (Sarg.) Hyland, *S. scopulina* Britt. non Greene), showy mountain ash, sorbier; Greenl, Labr and NS to Ont and Man. 5a, *S. d.* var. *groenlandica* Schneid.; Greenl, Labr, Nfld and Que.
6. *S. intermedia* (Ehrh.) Pers.; Europe; long cult.
7. *S. occidentalis* (Wats.) Greene; BC to Ore.
8. *S. scopulina* Greene; BC and Alta to Calif.
9. *S. sitchensis* Roem.; Alaska, Yukon and BC to Mont and Idaho.

Armillaria mellea (Vahl ex Fr.) Kummer: root rot, pourridié-agaric: on 4 BC 37:70, [535].

Botryosphaeria obtusa (Schw.) Shoem. (*Sphaeropsis malorum* Berk. ex Pk. non Berk.): canker, chancre: on *S. sp.* Ont 48:102, [996]; on 2 Ont 48:102, [996], NB 56:121, F56:25, [996]; on 3 Ont [996].

Coniothyrium olivaceum Bon.: on 25a Greenl [900].

C. pirinum (Sacc.) Sheldon: leaf spot, tache des feuilles: on 4 Man 44:102; on 6 Ont 33:123.

Cucurbitaria sorbi (Cda.) Karst.: on 25a Greenl [900].

Cytospora sp.: on *S. sp.* Alta 37:70, Sask 36:68.

C. chrysosperma Pers.: canker, chancre cytosporéen: on *S. sp.* Que NB 29:61, [cf. 1138].

C. leucostoma Sacc.: dieback, dépérissement: on *S. sp.* Man, 4 Alta 41:85; on 2 NS [1138].

C. microspora (Cda.) Rabh.: on 25a Greenl [900].

C. rubescens Nits.: canker, chancre cytosporéen: on *S. sp.* BC 61:106.

Daedalea unicolor Bull. ex Fr.: on 25a Greenl [900].

Dasyscyphus bicolor (Bull.) Fckl.: on 25a Greenl [900]; see *Betula*.

Dermea ariae (Pers. ex Fr.) Tul. ex Karst. (stat. conid. *Micropera sorbi*, q.v.): on *S. spp.* Ont Que NS [370]; on 2 Ont F59:65.

Diaporthe impulsula (Cke. & Pk.) Sacc.: on 2 Ont F59:65, NS [1138].

Dothiora sorbi (Wahl.) Rehm: on 2 Ont F59:65.

Dothiorella pyrenophora (Karst.) Sacc.: on *S. sp.* Alaska [175]; on 25a Greenl [900].

Sorbus

- Durandiella lenticellicola* Groves: on 2 Ont [373, p. 134].
- Erwinia amylovora* (Burr.) Winsl. et al. (*Bacillus amylovorus* (Burr.) Trev.): fire blight, brûlure bactérienne: on *S. sp.* Alta 51:108, Man 36:69, Ont 33:62, Que PEI 32:184, NB 62:90, [cf. 1138]; on 2 Que 39:100; on 4 Que 47:62, PEI 31:84.
- Eutypella sorbi* (Schm. ex Fr.) Sacc. (*Valsa s.* (Alb. & Schw.) Wint.): on *S. sp.* Alaska [175]; on 2 Ont F58:60; on ?5 Greenl [900].
- Fabraea maculata* Akt. (stat. conid. *Entomosporium maculatum* Lév.): leaf spot, tache des feuilles: on 2 Man 43:99, Que 32:109; on 7 BC 36:68, [535]; on 9 Alaska [175].
- Fomes ignarius* (L. ex Fr.) Kickx: on *S. sp.* Ont F55:59.
- Fusarium lateritium* Nees var. *mori* Desm.: on 2 Ont F63:70.
- Gymnosporangium clavipes* (Cke. & Pk.) Cke. & Pk.: rust, rouille: 0 I on *S. sp.* Ont 34:74, NS 39:110, 44:102, [1138]; on 2 Que 33:123; on 2, 4, 5 Ont [828]; on 4 Ont 55:118, NS [1138], [cf. 15, p. 362].
- G. cornutum* Arth. & Kern (*G. aurantiacum* Chev., *G. juniperi* Lk., nomina confus.): 0 I on *S. sp.* BC F52:151, Ont 38:94, F53:86, Que 35:61, NB 30:80; on 2 Ont NB, 4 Man Ont Que Greenl, 9 Alaska [15, p. 370]; on 2 Man [93, p. 64], Que 32:64, [197], NS Nfld 52:107, Nfld F53:24, 57:119; on 5, not 2, Ont 44:102, 46:79, 53:111; on 5, not 8, Ont 34:110; on 8, 9 Alaska [175], [cf. 1138].
- G. juniperinum* (L.) Mart.: 0 I on 2 Greenl [899]; the rust is probably *G. cornutum* on 5a.
- G. nootkatense* Arth.: 0 I on 7 Alaska BC [15, p. 357; 175], BC [1198]; on 9 Alaska [175], BC [1199].
- G. tremelloides* Hartig (*G. juniperinum* (L.) Mart., nom. confus.): 0 I on 7 BC Alta, 8 BC, 9 Alaska BC [15, p. 368]; on 7, 9 Alaska [175], BC [1198].
- Lophodermium tumidum* (Fr.) Rehm: on petioles of 2 NS [1138].
- Melanomma pulvis-pyrinus* (Fr.) Fckl.: on 2 Que [53].
- M. subsparsum* Fckl.: on 2 NS [1138].
- Melanostroma sorbi* Rostr.: on ?5a Greenl [900, p. 627].
- Micropera sorbi* (Fr.) Sacc.: on 2 NB 56:121, NS [1138].
- Mollisia cinerea* (Batsch) Karst.: on ?5a Greenl [900].
- Mycosphaerella maculiformis* (Pers. ex Fr.) Schroet.: on 2 Que [53].
- Nectria cinnabarina* Tode ex Fr.: on *S. sp.* NS 32:84; recorded on *S. sp.* BC [1198]; on *S. sp.*, 9 Alaska [175]; on 1 Que 41:85; on 4 NS [1138].
- N. galligena* Bres.: on *S. sp.* NS [1138].
- Phoma sorbi* (Lasch) Sacc.: on ?5a Greenl [900].
- Phyllactinia guttata* (Fr.) Lév. (*P. corylea* (Pers.) Karst.): on 9 BC [900].
- Polyporus pargamensis* Fr.: on *S. sp.* Ont F55:62.
- P. pubescens* Schum. ex Fr.: on 4 BC 46:79.
- P. tulipiferae* (Schw.) Overh.: from 3 Ont [791].
- Radulum tomentosum* Fr.: on ?5a Greenl [900].
- Rhabdospora inaequalis* Sacc.: on 9 Alaska [175].
- Rosellinia pulveracea* (Ehrh.) Fckl., *Septoria inaequalis* Sacc., *Steganosporium cellulosum* Cda. and *Stereum hirsutum* Willd. ex Fr.: on ?5a Greenl [900].
- Tubercularia vulgaris* Tode: on *S. sp.* BC [1198], Alta F63:105.
- Tympanis sorbi* Groves: on 2 Ont [372, p. 637].
- Valsa amphibola* Sacc.: on 2 NS [1138].
- V. persoonii* Nits. (*Leucostoma p.* (Nits.) Höhn.): on *S. sp.* Alta F63:104.

Sorghum Moench

GRAMINEAE

Annual or perennial stout grasses of warm regions of the Old World, sometimes naturalized in the New World; cult. for grain, syrup, forage and broom production.

1. *S. sudanense* (Piper) Stapf (*S. vulgare* var. *s.* (Piper) Hitchc., *Holcus sudanensis* (Piper) Bailey), Sudan grass, herbe du Soudan; Africa.
2. *S. vulgare* Pers. (*Holcus sorghum* L.), sorghum, sorgho; Africa.

Bipolaris turcica (Pass.) Shoem. (*Helminthosporium turcicum* Pass.): leaf blotch, brûlure foliaire: on 1 Ont 43:33.

Colletotrichum graminicola (Ces.) G.W.Wils.: anthracnose, anthracnose: on 1 Alta 54:52.

Piricularia grisea (Cke.) Sacc.: gray leaf spot, tache grise: on 1 Man 24:18, [93, p. 124].

Pseudomonas syringae van Hall (*Bacillus sorghi* Burr., *Phytomonas holci* (Kendr.) Bergey et al.): bacterial leaf spot, tache bactérienne: on 1 Alta 29:24, 51:35, Sask 30:36, Sask Man [93, p. 28], Man 34:24, 38:23, 39:32, Ont 36:18, NS 35:21; on 2 Alta 46:27, Man 36:18, 38:23, Que 43:29, NB 38:23; on 2 var. Que 44:30, 56:47.

Ustilago sorghi Pass. apud. Thüm. (*Sphacelotheca s.* (Lk.) Clint.): covered kernel smut, charbon couvert: on 2 BC 36:18, Sask Man [93, p. 61], Man 39:32, Que 40:25, BC Man Ont Que [292].

Sparganium L.

SPARGANIACEAE

Perennials of cool and temperate regions of the northern hemisphere, and of Australia and New Zealand.

1. *S. chlorocarpum* Rydb. var. *acaule* (Beeby) Fern. (*S. diversifolium* auct. Am.); in Canada from Nfld and NS to Que and Ont.
2. *S. eurycarpum* Engelm.; in Canada from Que to Alta and BC.

Burrillia acori Dearn. in Zundel: on leaves of ?2, not *Acorus calamus*, Ont; not a smut, but apparently a chytrid [957].

B. anomala Crowell: on 1 Ont [230, p. 327]; probably not distinguishable from *B. acori*.

Uromyces sparganii Clint. & Pk. ssp. *sparganii*: II III on 2 Ont Que NS [831], Ont Que [15, p. 116], NS [1138].

Spartina Sherb.

GRAMINEAE

Coarse perennial grasses of Europe, the Mediterranean region, N. and S. America.

1. *S. alterniflora* Loisel., saltmarsh grass, herbe salée; in Canada from Nfld to Que.
2. *S. gracilis* Trin.; in Canada from Sask to BC.
3. *S. patens* (Ait.) Muhl., highwater grass, musotte; in Canada from Nfld to Que.
4. *S. pectinata* Lk. (*S. michauxiana* Hitchc.), slough grass, herbe à liens; Nfld to Alta.

Claviceps purpurea (Fr.) Tul.: on 2 Alta [172], Sask 34:110, [1034], Sask Man [93, p. 45].

Drechslera tritici-repentis (Died.) Shoem.: on 4 Ont [993].

Erysiphe graminis DC. ex Mérat: on 2 Sask [1034].

Leptosphaeria personata Niessl: on *S. sp.* PEI 34:110, [1138].

Puccinia distichlidis Ell. & Ev.: II III on *S. sp.*, 2 Sask, 4 Sask Man [93, p. 67]; on 4 Sask Man [15, p. 167], NS [1138]; the occurrence of this rust in NS seems doubtful.

P. seymouriana Arth.: II III on 3 NS [956]; on 4 Ont Que [15, p. 166; cf. 828].

P. sparganioides Ell. & Barth. (*P. peridermiospora* (Ell. & Tracy) Arth.): II III on 3, 4, NS 52:41, 54:54, with 0 I on *Fraxinus* [1138]; on 4 Que 32:109, [cf. 15, p. 165].

Uromyces acuminatus Arth.: II III on *S. sp.*, 1, 3, 4 NS [1138]; on *S. sp.* NS 34:110, PEI 53:52; on 4 NS 51:41 et seq. [cf. 828].

U. acuminatus var. *magnatus* (Arth.) Davis: II III on 2 Sask, 4 Man [93, p. 72].

U. acuminatus var. *polemonii* (Pk.) Davis: on 2, 4 Sask [93]; Arthur [15] recognized four varieties in all, but their value is uncertain.

Spergula L. CARYOPHYLLACEAE

Herbs of the Old World.

1. *S. arvensis* L., corn spurrey, spargoute; naturalized from Europe; a common weed from Que eastward and in s. BC and in Alta.

Peronospora alsinearum Casp.: on 1 PEI 25:81, [cf. 1138].

P. obovata Bon.: on 1 Alaska [175], NS [1138].

Puccinia arenariae (Schum.) Wint. (*P. spergulae* DC.): III on 1 NS PEI [1138], PEI 25:81, [cf. 15, p. 236].

Aster yellows virus: aster yellows, jaunisse de l'aster: on 1 NB 31:125.

Spergularia J. & C. Presl CARYOPHYLLACEAE

Low herbs, mainly annuals and biennials, of almost cosmopolitan distribution.

1. *S. canadensis* (Pers.) Don; Labr and Que, Alaska and BC.

Uromyces acuminatus Arth. var. *spartinae* (Farl.) Arth.: 0 I on 1 NS PEI [1138].

Sphaeralcea St.Hil. MALVACEAE

Annual or perennial herbs of America and Africa.

1. *S. coccinea* (Pursh) Rydb. (*Malvastrum coccineum* (Pursh) Gray); in Canada from Man to Alta.

Puccinia sherardiana Körn.: III on 1 Alta Sask Man [93, p. 71], Alta Sask [15, p. 133], Alta 29:77, Sask 30:97, Man 24:30.

Sphenopholis Scribn. GRAMINEAE

Slender perennial grasses of N. America.

1. *S. intermedia* Rydb. (*S. pallens* auct. non (Biebler) Scribn.); Nfld to Alaska.
2. *S. obtusata* (Michx.) Scribn.; Ont to Man, Alta and BC.

Claviceps purpurea (Fr.) Tul.: 2 infected with a rye isolate Alta [172].

Mycosphaerella tassiana (de Not.) Johans.: on 2 BC [50].

Puccinia eatoniae Arth.: II III on 1 Ont, 2 Sask [15, p. 147; 93, p. 67], [cf. 828].

Spinacia L. CHENOPODIACEAE

Annual herbs of s.w. Asia; one widely cult.

1. *S. oleracea* L., spinach, épinard; cult.; a casual waif.

Ascochyta chenopodii Rostr.: seed spot, ascochytose: on 1 BC [535].

Cercospora bertrandii Chupp [190, p. 110]: leaf spot, tache cercosporéenne: on 1 Que type 43:70; known only from the type collection.

Colletotrichum spinaceae Ell. & Halst. [*C. dematium* (Pers. ex Fr.) Grove f. s. (Ell. & Halst.) Arx, 15b, p. 460]: anthracnose, anthracnose: on 1 Que 24:43, PEI 34:16, [1138].

Erwinia carotovora (L.R.Jones) Holland (*Bacillus carotovorus* L.R.Jones): soft rot, pourriture molle: on 1 Alta 30:50, 31:52.

Fungi from seed: of 1: *Alternaria consortialis* (Thüm.) Groves & Hughes, Ont; *A. tenuis* auct. sensu Wiltshire, Ont Denmark Netherlands; *Botrytis cinerea* Pers., BC; *Cephalosporium acremonium* Cda., Man; *Chaetomium cochliodes* Pall., *C. globosum* Kze., *Cladosporium cladosporioides* (Fres.) De Vries, *C. herbarum* Fr., Ont; *C. malorum* Ruehle, Minn; *Cunninghamella elegans* Lendner, Conn Ohio; *Curvularia inaequalis* (Shear) Boed., *Epicoccum neglectum* Desm., *Fusarium acuminatum* Ell. & Ev., Ont [374]. *F. avenaceum* (Fr.) Sacc., BC Netherlands; *F. culmorum* (Lib.) Sacc., Denmark Netherlands [334]. *F. equiseti* (Cda.) Sacc., Ont Pa; *F. oxysporum* Schlecht., Ont Que; *F. poae* (Pk.) Wr., Ont; *Heterosporium variabile* Cke., BC Wash; *Melanospora papillatum* Hotson, Ont; *Sordaria fimicola* (Rob.) Ces. & de Not., Netherlands; *Stemphylium botryosum* Wallr., Ont; *Verticillium albo-atrum* Reinke & Berth., Man; *V. dahliae* Ont England [374].

Fusarium spp.: from 1: *F. acuminatum* and *F. oxysporum* from basal parts of wilted plants, Man; *F. equiseti* from sporodochia on infected crowns, Man; and from wilted plants, Ont [335].

F. oxysporum Schlecht. var. *redolens* (Wr.) Gordon or *F. sp.*: wilt, flétrissure fusarienne: on 1 BC 39:59, but the disease noted earlier, 35:39, Ont 32:52, 42:64, Que 57:83.

Heterosporium variabile Cke.: leaf spot, tache hétérosporienne: on 1 BC 41:52.

Peronospora farinosa (Fr.) Fr. (*P. effusa* (Grev.) Rabh., *P. spinaciae* Laub.): downy mildew, mildiou: on 1 BC 32:51, Sask Man [93, p. 30], Ont 25:56, Que 29:37, NB 27:81, NS 30:50, PEI 24:43, NB NS PEI [1138]; the disease varies greatly in intensity

Spinacia

from field to field and from season to season and occasionally the crop is almost a total loss.

Phytophthora megasperma Drechsl.: black root rot, pourriture des racines: on 1 BC [535].

Puccinia aristidae Tracy (*P. subnitens* Diet.): rust, rouille: 0 I on 1 BC 52:72, Alta 24:43, [15, p. 158], Sask 40:53.

Pythium ultimum Trow: damping-off, fonte des semis: on 1 BC 36:39, [535].

Rhizoctonia solani Kühn.: damping-off, fonte des semis: on 1 Ont 59:63.

Sclerotinia sclerotiorum (Lib.) de Bary: sclerotinia rot, pourridié sclérotique: on 1 PEI 43:71.

Stemphylium botryosum Wallr.: leaf spot, tache stemphylienne: on 1 BC 43:71, 48:65, [535].

Aster yellows virus (callistephus virus 1): aster yellows, jaunisse de l'aster: on 1 NB 44:72, NS 60:99, possibly in Ont 41:53.

Cucumber mosaic virus (cucumis virus 1): cucumber mosaic, mosaïque du concombre: on 1 Ont 50:83, possibly in Ont 38:56, NB 25:57, PEI 38:56, 41:53.

Magnesium deficiency, carence de magnésie: on 1 PEI 43:71.

Manganese deficiency, carence de manganèse: chlorosis and leaf drop, chlorose-affaîssement: on 1 Ont 51:76.

Spiraea L.

ROSACEAE

Deciduous shrubs of the temperate regions of the northern hemisphere; widely cult. for their decorative flowers.

1. *S. alba* Du Roy (*S. salicifolia* auct. Am.), meadowsweet, thé du Canada; from Que to Man and Alta in Canada.

2. *S. latifolia* (Ait.) Borkh., meadowsweet, thé du Canada; in Canada from Nfld and NS to Ont.

3. *S. lucida* Dougl.; Alta and BC to Ore and Mont.

4. *S. menziesii* Hook., hardhack; Alaska to Ore.

5. *S. tomentosa* L., steeple bush, thé du Canada; in Canada from PEI and NS to Que and Ont.

6. × *S. vanhouttei* (Briot) Zabel, spiraea, spirée van Houtt; widely cult.

Other host: 7, × *S. arguta* Zabel.

Cercospora rubigo Cke. & Harkn.: on 1 Ont [93, p. 115]; the species is probably *C. laxipes* Davis [190].

Cryptodiaporthe macounii (Dearn.) Wehm.: on 4 BC [50].

Cylindrosporium ariaefolium Ell. & Ev.: on 2 NS [1138].

C. fairmanianum Sacc.: on 2 PEI, probably identical with *C. ariaefolium* [1138].

C. filipendulae Thüm.: on 1 NS [1138]; on 3 BC [1198].

C. salicifoliae (Trel.) Davis (*Septoria s.* (Trel.) Ell. & Ev.): on 1 Man 23:122, Man Ont [93, p. 130]; on 2 NS [1138], probably identical with *C. filipendulae* [291, 1138].

C. spiraeicola Ell. & Ev.: leaf spot, tache cylindrosporiennne: on 3 BC [535]; reported on *S. spp.*, Que 58:110, but doubtful; cf. Dearness, 24:74.

Diaporthe viburni Dearn. & Bisby var. *spiraeicola* Wehm.: on *S. sp.* NS [1138].

Fusarium spp.: *F. sp.* reported as the cause of a foot rot of 6 Que 57:121; *F. equiseti* (Cda.) Sacc. on 6 affected by dieback, apparently following winter injury Que 62:92.

Godronia spiraeae (Rehm) Seav. (*Scleroderris s.* (Rehm): on *S. sp.*, 5 NS [1138]; on 1 Ont [979].

Gloeosporium sp.: anthracnose, anthracnose: on 6 Que 57:121.

Heterosporium spiraeae Syd.: on *S. sp.* cult. Alaska [175].

Lachnum virgineum (Batsch) Karst.: on *S. sp.* NS [1138].

Mollisia stictella Sacc. & Speg.: on twigs of *S. spp.* NS [1138].

Mycosphaerella tassiana (de Not.) Johans.: on 3 BC [50].

Nectria cinnabarina (Tode) Fr. (*Creonectria purpurea* (L.) Seav.): dieback or coral spot, dépérissement nectrien: on *S. sp.* cult. Man [93, p. 46], NS 34:92, [1138]; on 4 BC [50]; on 6 Que 55:127, 58:110.

Ophiobolus porphyrogonus (Tode) Sacc.: on *S. sp.* NS [1138].

Podosphaera clandestina (Wallr. ex Fr.) Lév. (*P. oxycanthae* (DC.) de Bary): on 1, 2, 5 NS [1138].

Strickeria obducens (Fr.) Wint.: on *S. sp.* NS [1138].

Synchytrium vaccinii Thomas: on *S. sp.* NS [542], not *S. aureum* Schroet. [1138].

Iron deficiency, carence de fer: chlorosis, chlorose: on *S. spp.*, lime-induced, Man 62:92.

Low temperature, basse temperature: winter injury, gelure: on 6 NB 34:92; on 7 Sask 35:73.

Spirodela Schleid.

LEMNACEAE

Minute stemless plants of temperate and tropical regions.

1. *S. polyrhiza* (L.) Schleid.; in Canada from PEI, Que and Ont to s. BC.

Tracya lemnae (Setch.) Syd.: on 1 Man [93, p. 61; 292].

Sporobolus R.Br.

GRAMINEAE

Annual or perennial grasses of temperate and tropical N. and S. America, Asia and Africa.

1. *S. cryptandrus* (Torr.) Gray; Que to Man and Alta.

2. *S. neglectus* Nash; NB to Ont, Man and Alta.

Claviceps purpurea (Fr.) Tul.: 2 infected with a rye isolate Alta [172].

Puccinia graminis Pers.: II III on 1 Man [93, p. 68; cf. 15, p. 173].

Stachys L.

LABIATAE

Annual, biennial or perennial herbs of widespread distribution.

1. *S. ciliata* Dougl.; BC to Ore.

2. *S. palustris* L., wound wort, crapaudine; naturalized from Europe and now in Nfld, NS to Ont. 2a, *S. p.* var. *pilosa* (Nutt.) Fern. (*S. scopulorum* Greene); from Que, Ont and Man to Alta, Yukon, Alaska and Calif.

Erysiphe cichoracearum DC. ex Méral: on 1 BC [535]; on 2a Man [93, p. 44].

E. galeopsidis DC. ex Méral: on 2a Man, Sask [93].

Septoria stachydis Rob. & Desm.: on 2a Man [93, p. 140].

Stellaria L.

CARYOPHYLLACEAE

Herbs of nearly cosmopolitan distribution.

1. *S. calycantha* (Ledeb.) Bong. (*S. borealis* Bigel.); Greenl, Nfld, PEI and Que to Alaska.
2. *S. crispa* Cham. & Schl.; Alaska to Calif.
3. *S. graminea* L., grass-leaved stichwort, stellaire à feuilles de graminée; introduced from Europe and now across Canada, especially abundant in the Maritime Provinces.
4. *S. humifusa* Rottb.; Greenl, Nfld and NS to Alaska.
5. *S. laeta* Richards.; apparently not distinct from 7.
6. *S. longifolia* Muhl.; Nfld and NS to Alaska.
7. *S. longipes* Muhl. (*S. arctica* Schischkin, *Alsine a.*, *S. stricta* Richards., *Alsine s.*); Greenl to Alaska and s. to NS.
8. *S. media* (L.) Cyrillo, common chickweed, mouron des oiseaux; introduced from Europe, now a weed in all provinces.
9. *S. monantha* Hultén; Greenl, Labr, Nfld and Que to Alaska and BC.
10. *S. palustris* Retz. (*S. glauca* With.); arctic Eurasia.

Other host: 11, *S. edwardsii* R. Br.

Ascochyta dianthi (Alb. & Schw.) Lib.: on 4 Alaska [1038], Greenl [603, 901].

Cladosporium herbarum Lk.: on 7 Frank [903].

Diplodina papaveris (Oud.) Lind: on 7 Greenl [603].

Guignardia stromatica (Fckl.) Petr.: on 5 Frank [52].

Helotiella erythrostigma (Rehm) Sacc.: on 7 Greenl [603].

Leptosphaeria silenes-acaulis de Not. (*L. stellariae* Rostr.): on 4 Alaska [175]; on 4, 7 Greenl [899, p. 557]; on 7 Alaska [1038], Frank [604].

Melampsorella caryophyllacearum Schroet. (*M. cerastii* Schroet., *M. elatina* Arth.): II III on 1 BC [1199], Alaska [983]; on 1, 7 Que 34:110, [197]; on 2, 8 BC [1198]; on 3 Ont 24:48; on 3, 8 Ont [828], NS [1138]; on 7 Alaska [175], Alta [15, p. 21]; on 7, 9, Que [828].

Mycosphaerella cerastii (Pers.) Schroet.: on 1 Que [8]; a doubtful record.

M. tassiana (de Not.) Johans. (*M. pachyasca* (Rostr.) Vesterg., *M. stellarinearum* (Rabh.) Johans.,

Sphaerella s. (Rabh.) Karst.): on 1 Alaska [983]; on 4, 7 Greenl [899]; on 7 Alaska [175], Alaska Keew Frank Greenl [604], BC [50], Frank [600], Greenl [602, 603, 604].

M. tassiana var. *arctica* (Rostr.) Barr: on 5, 9 Frank [52].

Phoma herbarum West.: on 7 Greenl [899].

P. nebulosa (Pers.) Mont.: on 7 Man [604].

Pleospora androsaces Fckl. (*Pyrenophora a.* (Fckl.) Sacc.): on 7 Mack [604]; the records on *Alsine arcticum* from Mack and Alaska in [604] appear, after further study, to belong to *Arenaria a.* Stev.

P. cerastii Oud. (*Pyrenophora c.* (Oud.) Lind): on 7 Alaska, Frank [604], Greenl [601].

P. comata Auersw. & Niessl (*Pyrenophora c.* (Niessl) Sacc.): on 7 Greenl [601].

P. helvetica Niessl: on 5, 9 Frank [52].

P. herbarum (Fr.) Rabh.: on 4 Greenl [900]; on 7 Frank [903].

P. penicillus (Schm.) Fckl. var. *p.* (*Pyrenophora chrysospora* (Niessl) Sacc.): on 7 Greenl [603].

P. phaeocomoides (Berk. & Br.) Wint. var. *infectoria* (Fckl.) Wehm. (*P. i.* Fckl.): on 7 Greenl [603].

Puccinia arenariae (Schum.) Wint.: III on 1 Greenl [900]; on 6, 7 Sask [93, p. 66]; on 7 Alaska [175], Alta [15, p. 236], Sask 33:123, Greenl [603]; on 7, 10 Greenl [899]; on 8 PEI 25:81, [1138]; on 9 Frank [962].

Ramularia stellariae Rabh.: on 1 BC [535].

Septoria stellariae Rob. & Desm.: on 4 Greenl [899]; on 5, 9, 11 Frank [971]; on 8 BC [535], Man [93, p. 140; 604], NS [1138].

Trochila stellariae Rostr. (*Naevia s.* (Rostr.) Lind, *Laetinaevia s.* (Rostr.) Lind): on 7 Frank [604], Greenl [602; 899, p. 510; 901].

Ustilago violacea (Pers.) Roussel sensu lat.: on 1 Greenl [900].

U. violacea var. *stellariae* (Sow.) Savile: on 1 Alaska, 7 Mack [953].

White clover mosaic virus: isolated from 8 BC [860].

Stenanthium Kunth

LILIACEAE

Bulbous herbs of N. America and e. Asia.

1. *S. occidentale* Gray, mountain bells; BC and Alta to Mont and Calif.

Mycosphaerella tassiana (de Not.) Johans.: on 1 BC [50].

Pleospora comata Auersw. & Niessl: on 1 BC [50].

P. scrophulariae (Desm.) Höhn. var. *compositarum* (Earle) Wehm. (*P. c.* Earle): on 1 BC [50].

Stipa L.

GRAMINEAE

Tufted perennial grasses of tropical and temperate regions.

1. *S. columbiana* Macoun; Yukon to Calif.
2. *S. comata* Trin. & Rupr., spear grass; Man to Yukon and Calif. 2a, *S. c.* var. *intermedia* Scribn. & Tweedy (*S. tweedyi* Scribn.); Alta.
3. *S. lettermani* Vasey; Mont and Ore.
4. *S. spartea* Trin.; Ont to BC in Canada.

Stipa

5. *S. viridula* Trin., feather bunch grass; Man to BC in Canada.

Claviceps purpurea (Fr.) Tul.: ergot, ergot: on 4, 5 Alta, and the same hosts artificially infected with a rye isolate [172]; on 3 Alta 55:52, Sask Man [1034], Man 31:125, [93, p. 45].

Mycosphaerella tassiana (de Not.) Johans.: on *S. spp.* BC [50].

Platyspora pentamera (Karst.) Wehm. (*Clathrospora p.* (Cke.) Sacc.): on 2 BC [50].

P. permunda (Cke.) Wehm. (*Clathrospora p.* (Cke.) Sacc.): on 2 BC [50].

Puccinia stipae Arth.: rust, rouille: II III on 2 Alta Man, 2a Alta [15, p. 141]; on 2, 4 Sask Man, 2a Alta [93, p. 71].

P. substerilis Ell. & Ev. (*P. scaber* (Ell. & Ev.) Barth.): rust, rouille: II III on 5 Alta 25:81, Alta Man [15, p. 140], Sask 24:61, Man 29:78, [93, p. 71].

Pythium debaryanum Hesse: on 2 Sask [1034].

P. graminicola Subram. (*P. arrhenomanes* Drechsl.): on 2 Sask 37:6.

Septoria secalis Prill & Delacr. var. *stipae* Sprague: on 1 Yukon [1042].

Spermospora subulata (Sprague) Sprague: on 3 Alta [1034]; if this collection was made in Alta the host is probably 5.

Urocystis fraseri Clint. & Zundel (*Sorosporium granulolum* Ell. & Tracy, not *U. grandulosa* Clint.): on 2 Sask [93, p. 61; 292].

Ustilago hypodytes (Schlecht.) Fr.: on 2 Sask 33:123, Man 29:78; on 2 Sask Man, 5 Alta Sask Man [292]; on 2 Sask, 75 Man [93, p. 62].

Stokesia L'Her.

COMPOSITAE

One species, native to N. America; cult. for its flowers.

1. *S. laevis* Greene, Stokes' aster, aster de Stokes; SC to Fla and La.

Botrytis ?cinerea Pers.: on 1 Ont 28:99.

Streptopus Michx.

LILIACEAE

Herbs of cool regions of the northern hemisphere.

1. *S. amplexifolius* (L.) DC. var. *americanus* Schultes; Greenl, Nfld, Labr and NS to Man and Alaska.

2. *S. curvipes* Vail (*S. roseus* var. *c.* (Vail) Fassett); Alaska to BC and Ore.

3. *S. roseus* Michx., cariboo berry, rognons de coq; Labr, Nfld, and NS to Ont and Man.

Botrytis cinerea Pers.: on 1 Greenl [900]; ? on 2 Alaska [983].

Ceratobasidium anceps (Bres. & Syd.) Jackson: on 3 Ont [495].

Mollisia atrata (Pers.) Karst.: on 1 Greenl [900].

Sclerotium baccarum Rostr.: on 1 Greenl [900, p. 632].

Tubercinia clintoniae Kom.: on 2 Alaska [983], BC [963]; on 3 BC [292].

Suaeda Forsk.

CHENOPODIACEAE

Fleshy plants of salt marshes, nearly cosmopolitan.

1. *S. maritima* (L.) Dumort., seablite, blanchette; PEI and NS to Que.

Uromyces peckianus Farl.: 0 I on 1 NS [15, p. 160; 1138].

Swertia L.

GENTIANACEAE

Perennial herbs of Europe, Asia, Africa and N. America.

1. *S. perennis* L.; Alaska to Utah and Calif.

Puccinia swertiae Wint.: 0 I III on 1 Alaska [15, p. 323; 175].

Symphoricarpos Duham.

CAPRIFOLIACEAE

Upright shrubs mostly of N. America and one of China.

1. *S. albus* (L.) Blake (*S. racemosus* Michx.), snowberry, graine d'hiver; Que to BC. 1a, *S. a.* var. *laevigatus* Fern. (*S. rivularis* Suksd.); Alaska to Calif.; escaped from cult. in Que and probably elsewhere.

2. *S. occidentalis* Hook.; in Canada from Ont to BC.

3. *S. orbiculatus* Moench; native to the US, and also spread from cult.

Anthostoma melanotes (Berk. & Br.) Sacc. var. *symphoricarpi* Brenkle: on dead twigs of 2 Man [93, p. 56].

Camarosporium umbonatum Brenkle: on twigs of 2 Man [93, p. 132].

Cercospora symphoricarpi Ell.: leaf spot, tache cercosporéenne: on 1 Alaska [175], BC 34:110, [535, 1198], Alaska BC [341].

Cytospora symphoricarpi Ell. & Barth.: on twigs of 2 Man [93, p. 58].

Didymosphaeria decolorans Rehm: on dead twigs of 2 Man [93, p. 54].

Dothichiza symphoricarpi Rehm: on twigs of 2 Man [93, p. 133].

Fusarium concolor Rg.: isolated from seedlings of 2 in greenhouse Man [335].

Gibbera andersonii Shoem. [994, p. 1421] (*Oothia symphoricarpi* Ell. & Ev.): on twigs of 2 Man [93, p. 52].

Griphosphaerioma kansensis (Ell. & Ev.) Shoem. (*Cryptospora k.* Ell. & Ev.): on twigs of 2 Man [93, p. 58; 994, p. 1419].

Haplosporella symphoricarpi Pk.: on 2 Man [93, p. 133].

Hymenochaete cinnamomea (Pers.) Bres.: on 2 Man [93, p. 77].

Labridella cornu-cervae Brenkle (*Pestalotia pezizoides* de Not. f. *longiseta* Dearn.); stat. conid. of *Griphosphaeria kansensis*, q.v.): on 2 Man [93, p. 131].

- Lophidium* sp.: on branches of 2 Man [93, p. 52].
Lophiostoma praemorsum (Lasch) Fckl.: on twigs of 2 Man [93, p. 52].
L. triseptatum Pk.: on 2 Man [93, p. 53].
Metasphaeria sp.: on 2 Man [93, p. 55].
Microsphaera diffusa Cke. & Pk (*M. symphoricarpi* Howe): powdery mildew, blanc: on 1 BC 61:108, [50, 535], PEI 43:116; on 1 Sask, 2 Man [93, p. 44]; on 3 Ont 43:116.
Mollisia caesia (Fckl.) Sacc.: on old stems of 2 Man [93, p. 40].
Mycosphaerella tassiana (de Not.) Johans.: on 1 BC [50].
Peniophora cinerea (Fr.) Cke.: on dead branches of 2 Man [93, p. 77].
P. greschekii (Bres.) Bourd. & Galz. (*P. subcremea* Höhn. & Litsch.): on stems of 2 Man [93, p. 78]; see *Abies*.
Phyllosticta symphoricarpi West.: leaf spot, tache foliaire: on *S.* sp. Que 56:132; PEI 25:75, [1138].
?Pseudomonas syringae van Hall: bacterial blight, brûlure bactérienne: on ?3 Que 48:114.
Puccinia crandallii Pamm. & Hume: rust, rouille des fétiques: 0 I on 1 BC, 2 Sask [15, p. 102]; on 1 BC [1198]; common on 2 Sask Man [93, p. 67], Sask 30:99.
P. symphoricarpi Harkn.: rust, rouille: III on 1 Alaska BC [15, p. 163], BC 44:117, [535, 1198]; on 1, 1a Alaska [175].
Rhabdospora sp. (*R. symphoricarpi* nom. nud.): on twigs of 2 Man [93, p. 136].
Rhizogene symphoricarpi Syd.: black leaf spot, tache noire: on leaves of 2 Sask [93, p. 44].
Rosellinia parasitica Ell. & Ev.: on 2 Man [93, p. 51].
Schizoxylon decipiens Karst. var. *symphoricarpi* Rehm: on twigs of 2 Man [93, p. 42].
Septoria symphoricarpi Ell. & Ev.: leaf spot, tache septorienne: on 1 BC 34:111, [535]; on 2 Alta 34:110, Sask 30:99, Man 43:116, Sask Man [93, p. 140].
Sphaceloma symphoricarpi Barrus & Horsf.: anthracnose, anthracnose: on *S.* sp. Que 33:74, 34:92; on 1 Que 36:83.
Valsa symphoricarpi Rehm: on twigs of 2 Man [93, p. 58].

Syringa L.

OLEACEAE

Deciduous shrubs or small trees of Asia and s.e. Europe; cult. for the showy panicles of frequently fragrant flowers.

1. *S. amurensis* (Rupr.) Rupr.; Manchuria and n. China.
2. *S. villosa* Vahl.; China.
3. *S. vulgaris* L., lilac, lilas; s.e. Europe; long cult. and not rare in the wild state.

Agrobacterium tumefaciens (Sm. & Towns.) Conn: crown gall, tumeur du collet: on 3 Ont 62:93.

Ascochyta syringae Bres.: leaf spot, tache ascochytiq: reported on 3 PEI 25:72, [1138].

Botrytis cinerea Pers.: gray mold, moisissure grise: on 3 NB PEI 36:78, 38:109, [1138], NS 52:120, associated with bacterial blight NB 39:108.

Fusarium equiseti (Cda.) Sacc.: from decayed roots of 3 Sask [335].

Macrophoma halstedii (Ell. & Ev.) Tassi (*Phyllosticta h.* Ell. & Ev.): leaf spot, tache foliaire: reported from 3 Que 25:72.

Microsphaera penicillata (Wallr. ex Fr.) Lév. (*M. alni* (Wallr.) Salm.): powdery mildew, blanc: on 1 Ont 62:93; on 3 Man Ont Que PEI 24:55, Man [93, p. 44], NB NS 25:72, [cf. 1138]; common on 3 in the fall of the year.

Phyllosticta syringae West.: leaf spot, tache foliaire: on 3 BC 42:106, [535], Que 31:97, 33:124; ? a phase of *Ascochyta syringae*, fide [3].

P. ?syringella (Fckl.) Rabh.: leaf spot, tache foliaire: on 3 Que 58:110.

Phytophthora syringae Kleb.: shoot blight, brûlure des pousses: on 3 Que 40:98; possibly also in NB, although reported as bacterial blight, 38:109, 39:108.

Pseudomonas syringae van Hall: bacterial blight, brûlure bactérienne: on \times *S.* spp. Man 59:85; on 2, 3 Man 45:121; on 3 BC 41:98, [535], Alta 38:109, 45:121, Sask 33:70, 54:137, Ont 29:70, Que 57:115, NB 35:69, 61:108, NS 51:119, PEI 45:121; infection is sporadically severe.

Sclerotinia sp.: reported affecting young shoots and leaves of 3 Que 29:70.

Sphaeropsis syringae Pk. & Clint.: on twigs of 3 Man [93, p. 140].

?Lilac ringspot virus: ringspot, tache annulaire: on 3 BC 61:108.

Virus: mosaic, mosaïque: on 3 NB 36:78, 41:98, NS 34:87.

Graft blight, chlorosis, etc.: lilac-privet incompatibility: on 3 Man 43:116, NB 42:106, NS 36:78.

Taenidia Drude

UMBELLIFERAE

Glaucous perennial herbs of e. N. America.

1. *T. integerrima* (L.) Drude, yellow pimpernel; in Canada in Que and Ont.

Puccinia angelicae (Schum.) Fckl.: 0 I II III on 1 Ont [828; cf. 15, p. 319].

Tagetes L.

COMPOSITAE

Scented herbs of N. and S. America; a few popular garden plants.

1. *T. erecta* L., Aztec (African) marigold, grand œillet d'Inde; Mexico.
2. *T. patula* L., French marigold, petit œillet d'Inde; Mexico.
3. *T. tenuiflora* Cav. var. *pumila* Hort. (*T. signata* Bartl. var. *p.*); Mexico.

Botrytis cinerea Pers.: gray mold, moisissure grise: on 1 Alaska [175]; on 3 BC 33:67, [535].

Fusarium spp.: foot rot, pourridié fusarien: *F. oxysporum* Schlecht. from diseased roots of wilted 1 Man 38:109, [335]; from 2 Man 43:116; *F. o.* var. *redolens* (Wr.) Gordon from basal parts of 2 Man 39:108, [335].

Phyllosticta sp.: leaf spot, tache foliaire: on *T.* sp. Que 57:129.

Phytophthora sp. and *P. cryptogea* Pethbr. & Laff.: stem rot, pourridié phytophthoréen: on *T.* sp. Ont 61:116; on 3 BC [535].

Tagetes

Sclerotinia sclerotiorum (Lib.) de Bary: sclerotinia rot, pourriture sclérotique: on *T. sp.* NS 33:71.

Aster yellows virus (callistephus virus 1): aster yellows, jaunisse de l'aster: on *T. spp.* Sask NB 30:86, Man 40:98, Ont 58:120, Que 48:114, NB 33:71, NS 60:99; on 1 Alta 55:127, NB 37:80, PEI 32:88, 59:90; on 2 Ont 44:117, PEI 38:19; occasionally severe on *T. spp.* Man 57:129.

Tamarix L.

TAMARICACEAE

Deciduous shrubs or trees of Eurasia; mainly cult. for their feathery foliage and their flowers.

Coniothyrium ?tamaricis Oud.: on twigs of *T. sp.* cult. Man [93, p. 132].

Valsa ambiens (Pers. ex Fr.) Fr.: on *T. sp.* cult. Man [93, p. 51].

Tanacetum L.

COMPOSITAE

Herbs of the northern hemisphere.

1. *T. vulgare* L., tansy, tanaïs; introduced from Europe and now occurring from Nfld to BC.

Camarosporium tanacetii Oud.: on 1 NS [1138].

Leptosphaeria dolioloides Auersw.: on 1 NS [1138].

Mycosphaerella tassiana (de Not.) Johans.: on 1 BC [50].

Pleospora herbarum (Fr.) Rabh.: on 1 BC [50].

Ramularia tanacetii Lind: leaf spot, tache ramularienne: on 1 cult. Man [93, p. 125], 44:117.

Taraxacum Zinn

COMPOSITAE

Perennial or biennial herbs of cold and temperate regions of the northern hemisphere and the colder parts of the southern hemisphere.

1. *T. ceratophorum* (Ledeb.) DC. (including *T. hyperboreum* Dahlst.); Labr and Que to BC; also in n. Asia.
2. *T. erythrospermum* Andr. (*T. laevigatum* auct.); NS and Que to BC; naturalized from Europe.
3. *T. hyparcticum* Dahlst.; Greenl to Alaska; also in arctic Eurasia.
4. *T. kok-saghyz* Rodin; USSR; cult. during World War II as a source of rubber.
5. *T. lacerum* Greene (including *T. arctogenum* Dahlst., *T. umbrinum* Dahlst.); Greenl and Nfld to Yukon and BC.
6. *T. lapponicum* Kihlm. (*T. croceum* Dahlst.); Greenl, Nfld and Que to Alaska.
7. *T. latilobum* DC.; Nfld.
8. *T. lyratum* (Ledeb.) DC.; w. arctic Canada and Alaska.

9. *T. officinale* Weber (*T. vulgare* (Lam.) Schr.), common dandelion, pissenlit; naturalized from Europe and widespread in Canada.

10. *T. phymatocarpum* Vahl; Greenl and Nfld to Alaska; also in n. Asia.

Other hosts: 11, *T. dentifolium* G. Haglund. 12, *T. eurolepium* Dahlst. 13, *T. mutilum* Greene. 14, *T. pumilum* Dahlst.

Agrobacterium tumefaciens (Sm. & Towns.) Conn: crown gall, tumeur du collet: a single affected plant of 4 Ont 44:27.

Ascochyta taraxaci Grove: on *T. sp.* Alaska [175].

Low-temperature basidiomycete, basidiomycète frigophile: frequently isolated from diseased 9 Alta [215].

Ceratobasidium anceps (Bres. & Syd.) Jackson: on 9 Ont [495].

Cladosporium herbarum Lk.: on 3 Frank [903].

Colletotrichum dematium (Fr.) Grove: on 9 Man [93, p. 129].

Erwinia carotovora (L.R.Jones) Holland: soft rot, pourriture molle: on 4 Alta 42:27.

Fungi from seed: of 4: *Acremoniella verrucosa* Togn., *Alternaria consortialis* (Thüm.) Groves & Hughes, *A. tenuis* auct. sensu Wiltshire, *Aureobasidium pululans* (de Bary) Arn., USSR; *Bipolaris sorokiniana* (Sacc. in Sorok.) Shoem., Mont; *Botrytis cinerea* Pers., Ont; *Chaetomium globosum* Kze., NS USSR; *C. indicum* Cda., NS; *Cladosporium cladosporioides* (Fres.) De Vries, BC; *Cunninghamella elegans* Lendner, *Epicoccum nigrum* Lk., Ont; *Fusarium acuminatum* Ell. & Ev., Ont; *F. avenaceum* (Fr.) Sacc., USSR; *F. equiseti* (Cda.) Sacc., Mont USSR; *F. oxysporum* Schlecht., BC; *F. solani* (Mart.) App. & Wr., Alta [374; cf. 334]. *Gonatobotrys simplex* Cda., Ont; *Mucor hiemalis* Wehmer, *M. racemosus* Fres., USSR; *Papularia arundinis* (Cda.) Fr., NS; *Sordaria fimicola* (Rob.) Ces. & de Not., USSR [374].

Fusarium sp.: root rot, pourridié: *F. sp.* was the dominant isolate from affected tissues of 4 NS 43:25.

Heteropatella umbilicata (Pers. ex Fr.) Jaap (*Septoria cercospermia* Rostr.): on *T. sp.* Greenl [902].

Meloidogyne sp. (*Heterodera marioni* (Cornu) Goodey): on 4 Ont 43:25; on 9 in a strawberry field BC 48:93.

Mycosphaerella taraxaci (Karst.) Lind (*Sphaerella t.* Karst., *S. compositarium* auct. non Auersw.; stat. conid. ?*Cersosporella angustana* Ferr.): on *T. sp.* Que, 5, 10, 11 Frank [52]; on 1 Greenl [899]; on 3 Frank [604, 903]; on 3, 5 Greenl [603]; on 3, 25, 5 10, 14 Frank [971]; on 10 Greenl [602].

M. tassiana (de Not.) Johans. (*M. pachyasca* (Rostr.) Vestergr.): on 1 Frank, 12 Yukon [600].

M. tassiana var. *tassiana*: on 10 Frank [52].

Phoma cichoracearum Sacc.: on 3 Frank [903].

Platyspora pentamera (Karst.) Wehm. (*Clathrospora p.* (Karst.) Berl.): on 5 Frank [604].

Pleospora ambigua (Berl. & Bres.) Wehm.: on 10 Frank [52].

P. comata Auersw. & Niessl: on 5 Frank [52].

P. helvetica Niessl: on 5, 11 Frank [52].

P. herbarum (Fr.) Rabh.: on 3 Frank [903], Greenl [603].

P. phaeocomoides (Berk. & Br.) Wint. var. *infectoria* (Fckl.) Wehm. (*P. i.* Fckl.): on 3 Greenl [603]; on 5 Greenl [602].

Pleospora tragacanthae Rabh.: on 10 Frank [52].

Puccinia hieracii (Röhl.) Mart. (*P. taraxaci* Plowr.): 0 II III on 1, 2, 7 in greenhouse Ont 43:25; on 1, 2, 7, 9 Ont [828]; on 2, 4, 9 NS [1138]; on 4 Alta Man Ont NS 43:25; on 8 Alaska, 9 BC Alta Sask Ont Que NS [15, p. 352]; on 8, 9, 13 Alaska [175]; on 9 BC [535], BC NS PEI 25:81, Alta 34:111, Sask 31:125, Sask Man [93, p. 69], Man Ont Que 24:61.

P. variabilis Grev.: I II III on 9 NS [15, p. 351], 34:111, NS PEI [1138], PEI 26:40; also reported on 5 Mack [605]; on 6, 10 Greenl [902], 9 Greenl [899]; but according to Savile, *P. variabilis* occurs in N. America in Que and NS only.

Ramularia taraxaci Karst.: on *T. sp.* Alaska [175]; on 9 BC [535], Alta 34:111, Sask 30:99, Man [93, p. 125], Que 29:78, NS 26:40, [1138], PEI 25:81.

Rhizoctonia solani Kühn: on 9 Man [93, p. 125].

Sclerotinia sclerotiorum (Lib.) de Bary: sclerotinia wilt, flétrissure sclérotique: on 4 NS 43:26.

Sphaerotheca fuliginea (Schlecht. ex Fr.) Poll. (*S. humuli* (DC.) Burr. var. *f.* (Schlecht.) Salm., *S. macularis* (Wallr. ex Fr.) Magn. var. *f.* (Fr.) W.B.Cke., *S. castagnei* Lév.): on *T. spp.* BC [50]; on 3 Greenl [603]; on 9 Alaska [175], BC [535], BC Que 25:81, Sask 31:125, Sask Man [93, p. 45], NB 30:99, NS [1138], Greenl [900]; on 3, 25, 10, 14 Frank [971]. Some records incorrectly under *S. macularis*, Man 24:61, NS [1138].

Xanthomonas taraxaci Niederhauser: bacterial leaf spot, tache bactérienne: on 4 Man 42:27, cf. 43:26.

Aster yellows virus (callistephus virus 1): aster yellows, jaunisse de l'aster: on *T. sp.* NB 30:86; on 4 NB NS 43:26.

Taxus L.

TAXACEAE

Shrubs or small trees of the northern hemisphere.

1. *T. baccata* L., English yew, if; Europe, n. Africa and w. Asia.
2. *T. brevifolia* Nutt., western yew; BC to Mont and Calif.
3. *T. canadensis* Marsh., Canada yew, buis de sapin; Nfld to Man.
4. *T. cuspidata* Sieb. & Zucc., Japanese yew, if du Japon; Japan, Korea and Manchuria.

Hymenochaete badioferruginea (Mont.) Lév. and *H. fuliginosa* (Pers.) Bres.: on 2 BC [1198].

H. tabacina (Sow. ex Fr.) Lév.: on 3 NS [1138].

Lepidoderma carestianum (Rabh.) Rostr.: on 3 Que F60:44.

Meliola sp.: on 2 BC [1203].

Phacidium taxicola Dearn. & House: on 3 Ont [875].

Phomopsis sp.: on 1 var. BC [1198].

Phytophthora sp.: root rot and dieback, dépérissement: on *T. sp.* BC 61:108; *P. cinnamomi* Rands from 1 BC [1198].

Sphaerulina taxicola (Pk.) Berl.: on needles of 2 BC F57:87, [1199].

Chemical injury: from 2,4-D on *T. sp.* BC 61:108.

Sunburn, insolation: 4 more resistant than certain hybrids Ont 56:121.

Tellima R.Br.

SAXIFRAGACEAE

Coarse perennials of the Pacific coast of N. America.

1. *T. grandiflora* (Pursh) Dougl.; Alaska to Wash, Ore and Calif.

Puccinia heucherae (Schw.) Diet.: III on 1 Alaska [175], BC [535, 1198].

P. heucherae var. *austroberingiana* Savile: III on 1 type BC [954, p. 407].

Sphaerotheca fuliginea (Schlecht. ex Fr.) Poll. (*S. macularis* (Wallr. ex Fr.) Magn. var. *f.* (Fr.) W.B.Cke.): on 1 Alaska [175].

Tetragonia L.

AIZOACEAE

Herbs or subshrubs of e. Asia and in the southern hemisphere.

1. *T. expansa* Murr., New Zealand spinach, épinard d'été; Japan, Australia, New Zealand and S. America; cult. as a pot herb.

Fungi from seed: of 1: *Alternaria consortialis* (Thüm.) Groves & Hughes, Wash; *A. tenuis* auct. sensu Wiltshire, *Chaetomium cochliodes* Palliser, Calif; *Cladosporium cladosporioides* (Fres.) De Vries, *Cunninghamella elegans* Lender, Wash [374]. *Fusarium equiseti* (Cda.) Sacc., *F. oxysporum* Schlecht., Ont [334]. *Stemphylium botryosum* Wallr., Calif; *Verticillium dahliae* Kleb., Wash [374].

Thalictrum L.

RANUNCULACEAE

Erect perennial herbs of the northern hemisphere; few cult. for ornament.

1. *T. alpinum* L.; Greenl, Labr, Nfld and Que to Alaska; circumpolar.
2. *T. dasycarpum* Fisch. & Lall.; in Canada from Ont to Alta.
3. *T. dioicum* L.; quicksilver weed; in Canada in s.w. Que and s. Ont.
4. *T. hultenii* Boivin; Alaska and e. Asia.
5. *T. occidentale* Gray; Alaska, Alta and BC to Wash and Calif.
6. *T. polygamum* Muhl., muskrat weed; Nfld to NS and Ont. 6a, *T. p.* var. *hebecarpum* Fern.; Lab, Nfld, NS and Que.
7. *T. rugosum* Ait.; s. Europe.
8. *T. sparsiflorum* Turcz.; Keew to Alaska and Calif; also in Asia.
9. *T. venulosum* Trel.; Que to Mack and BC.

Aecidium thalictri Johans.: on 1 Greenl [900]; this name was not traced.

Colletotrichum dematium (Fr.) Grove (*Vermicularia d.* Fr.): on 1 Que [604].

Cylindrosporium thalictri (Ell. & Ev.) Davis: on leaves of *T. sp.* Man [93, p. 131].

Thalictrum

- Didymosphaeria thalictri* Ell. & Dearn.: on *T. sp.* NS [1138].
- Dimerina sp.*: on 6 NS [1138].
- Entyloma thalictri* Schroet.: on leaves of 3 Man [93, p. 61], Man Ont [292].
- Erysiphe polygoni* DC. ex Mérat: on *T. sp.* NS, 6 PEI [1138]; on 2 Man [93, p. 44]; on 6 PEI 34:111.
- Fusarium spp.*: *F. acuminatum* Ell. & Ev. and *F. solani* (Mart.) App. & Wr. from diseased or discolored basal parts, *F. oxysporum* Schlecht. from apparently healthy roots of 9 Man; *F. oxysporum* and *F. o. var. redolens* (Wr.) Gordon from diseased basal parts of 7 Man [335].
- Leptosphaeria thalictri* Wint.: on 1 Greenl [899].
- Massaria thalictri* (Rostr.) Lind (*Lizonia t.* Rostr.): on 1 Que Greenl [604], Greenl [899, p. 556].
- Mycosphaerella tassiana* (de Not.) Johans. (*Sphaerella pachyasca* Rostr.): on 1 Greenl [899, 901].
- M. thalictri* (Ell. & Ev.) Lindau: on leaves of 3 Man [93, p. 53].
- Phoma herbarum* West.: on 1 Nfld [604].
- Phytophthora thalictri* G. W. Wils. & Davis: on 2, 3 Man [93, p. 31].
- Puccinia recondita* Rob. ex Desm. (*P. clematidis* Lagerh., *P. rubigo-vera* Wint., *P. r. var. agropyri* (Erikss.) Arth., *P. r. var. agropyrina* (Erikss.) Arth.): 0 I on 1 Que 33:124, [8]; on 1 Alta, 5 BC Alta [15, p. 178]; on 2, 9 Man [93, p. 71]; on 2, 6 Ont [828]; on 2 Sask Man Nfld, 3 Sask, 9 Alta [15, p. 180]; on 3 Sask 34:11; on 3 Man, 9 Alta Man [93, p. 70]; on 4 Alaska [175]; on 5 BC [1198]; on 6 NS [1138]; on 7 BC 33:124; on 9 Alta Sask 24:61; common on the prairies.
- P. septentrionalis* Juel (*Aecidium sommerfeltii* Johans.): 0 I on 1 Alaska [15, p. 231; 175], Greenl [899, 902].
- Rhabdospora rugica* Syd.: on dead stems of 2 Sask [93, p. 136].
- Selenophoma drabae* Syd. (*Septoria semilunaris* Johans.): on 1 Greenl [900].
- Septoria thalictri* Ell. & Ev.: on *T. sp.* Ont [93, p. 140].
- Tranzschelia thalictri* (Chev.) Diet. (*T. anemones* Pers.) Nannf. sensu lat.): III on *T. sp.* Alaska [175]; on *T. sp.*, 2 Man, 9 Sask [93, p. 72]; on 3, 6 Ont [828]; on 6, 6a NS [1138].
- Urocystis sorosporioides* Körn.: on 1 Greenl [900, 901]; on 6 Ont [292].

Thermopsis R.Br.

LEGUMINOSAE

Perennial herbs of N. America and Asia.

1. *T. rhombifolia* (Nutt.) Richards., golden bean; in Canada from Man to Alta.
- Cercospora thermopsidis* Earle: on 1 Sask 31:125, [93, p. 115].
- ?*Endodothella sp.*: on overwintered stems of 1 Sask [93, p. 47].
- Phoma thermopsidicola* Henn.: on stems of 1 Sask [93, p. 135].

Thlaspi L.

CRUCIFERAE

Annual or perennial herbs of the northern hemisphere.

1. *T. arcticum* Porsild (*T. alpestre* auct.), bouquet de Saint-Joseph; Yukon and Alaska.

2. *T. arvense* L., stinkweed, cennes; native to Eurasia; now in Greenl and Alaska, and a weed in all provinces, being most abundant and troublesome in the prairies.

Alternaria brassicae (Berk.) Sacc.: on 2 Man [93, p. 112].

Cladosporium herbarum Lk.: on 1 Yukon [600].

Phoma herbarum West.: on 1 Yukon [600].

P. lingam (Tode ex Fr.) Desm.: on 2 Sask 1963 [Vanterpoo in litt.].

Plasmidiophora brassicae Wor.: reported on 2 PEI [1138]; 2 infected experimentally PEI 37:49.

Puccinia aristidae Tracy: 0 I on 2 Sask [93, p. 66].

Aster yellows virus (callistephus virus 1): aster yellows, jaunisse de l'aster: on 2 Alta 56:55, Sask 53:40.

Thuja L.

PINACEAE

Evergreen coniferous trees of N. America and e. Asia.

1. *T. occidentalis* L., white cedar or American arbor-vitae, cèdre blanc; in Canada from w. PEI and NS to Man. Because of its resistance to decay, the wood is valuable for poles, posts, shingles, canoes and boat building.
2. *T. orientalis* L., Chinese arbor-vitae, arbre du Paradis; native to China and Korea and much cult. in Japan.
3. *T. plicata* Donn, cedar, cèdre; Alaska to BC, Mont and Calif. An important timber tree in BC, especially prized for poles, posts, shingles and house siding.

Aleurodiscus botryosus Burt: on 1 Ont Que [599].

A. canadensis Skolko: on 1 Que [599].

A. penicillatus Burt: on 3 BC [1198].

A. tsugae Yasuda apud Lloyd: on 1 Ont Que [599].

Anthostomella ?pholidigena Ell. & Ev.: on twigs of 1 Man [93, p. 170].

Armillaria mellea (Vahl ex Fr.) Kummer: root rot, pourridié-agaric: on 1 Canada 33:85, Que F62:50; on and from 3 BC [148, 744].

Asterostroma andinum Pat.: on 3 BC [1198].

Auricularia auricula (Hook.) Underw. (*A. auricularis* (Gray) Martin): on 3 BC [148, 1198].

Collybia acervata (Fr.) Gill.: on 3 BC [1198].

Coniophora betulae (Schum.) Karst.: on 3 BC [148, 1198].

C. puteana (Schum. ex Fr.) Karst. (*C. cerebella* Pers.): brown cubical rot, carie brune cubique: on 1 Man [93, p. 75]; from 1 Ont F55:61, NB NS F53:72; on or from 3 BC [148, 1198].

C. suffocata (Pk.) Masee: on 3 BC [148, 1198].

Corirolellus ?sepium (Berk.) Murr. (*Trametes s.* Berk.): on 3 BC [148].

C. sinuosus (Fr.) Sarkar (*Poria sinuosa* (Fr.) Sacc.): on 3 BC [148, 1198].

Corticium amylaceum Bourd. & Galz. (*Aleurodiscus amylaceus* (Bourd. & Galz.) Rogers & Jacks.): on 1 Ont Que [599]; on 3 BC [599, 1198].

Corticium bicolor Pk.: on 3 BC [148, 1198].

C. cebennense Bourd.: on 3 BC [148, 1198]; see *Pinus*.

- Corticium corrugae* (Burt.) Burt: on 3 BC [1198].
- C. electum* Jackson: on decorticated wood of 1 Ont [494, p. 146].
- C. furfuraceum* Bres.: on 3 BC [1198].
- C. fuscostratum* Burt: on 3 BC [1198]; see *Picea*.
- C. galactinum* (Fr.) Burt: white stringy rot, carie blanche filandreuse: from 1 Ont [1160], NB NS F53:22; on 3 BC [1198]; see *Abies*.
- C. notabile* Jackson: on 1 Ont [494, p. 156]; on 3 BC [1198].
- C. pelliculare* Karst.: on 3 BC [1198]; see *Abies*.
- C. propinquum* Jacks. & Dearden: on 3 type BC [499, p. 155, 1198]; see *Pseudotsuga*.
- C. radiosum* Fr.: on 3 BC [148, 1198]; see *Abies*.
- C. sulphureum* (Pers. ex Fr.) Fr.: on 3 BC [148, 1198]; see *Abies*.
- Coryneum berckmanii* Milbr.: needle blight, brûlure des aiguilles: on 2 BC 41:85, [1198].
- Crepidotus herbarum* Pk.: on 3 BC [148, 1198].
- Didymascella thujina* (Durand) Maire (*Keithia t.* Durand): needle blight, brûlure des aiguilles: on 1 Ont 24:49, 31:125, Que F60:44, NB PEI F60:33; on 3 BC 38:94, F54:130, [535, 1198], Alaska [175].
- Discina ancilis* (Pers.) Sacc.: on 3 BC [1198].
- Flammula decorata* Murr.: on 3 BC [148, 1198].
- F. liquiritae* (Weinm.) Quél.: on 3 BC [148, 1198].
- Fomes annosus* (Fr.) Karst.: root rot, maladie du rond: on and from 3 BC 41:85, [148, 1198].
- F. nigrolimitatus* (Rom.) Egel.: white pocket rot, carie blanche alvéolaire: on or from 3 BC [148, 1198].
- F. pini* (Brot. ex Fr.) Karst.: red ring rot, carie blanche alvéolaire: from 1 Ont F55:58; on 3 BC F53:152, [148, 1198].
- F. pinicola* (Sw. ex Fr.) Cke.: brown cubical rot, carie brune cubique: on and from 3 BC [148, 1198].
- Ganoderma applanatum* (Pers. ex Wallr.) Pat. (*Fomes applanatus* (Pers. ex Wallr.) Gill.): white mottled rot, carie blanche madrée: on 3 BC [131], Alaska [175].
- Gloeocystidiellum lividocaeruleum* (Karst.) Donk (*Corticium l.* Karst., *Aleurodiscus lividocaeruleus* (Karst.) Lemke): on 1 Ont [599]; on 3 BC [148, 599, 1198].
- Harknessia foeda* Sacc.: on 1 Ont 25:63.
- Hymenochaete cinnamomea* (Pers. ex Fr.) Bres.: on 3 BC [1198].
- H. fuliginosa* (Pers.) Bres.: on 3 BC [148, 1198].
- H. tabacina* (Sow. ex Fr.) Lév.: on and from 3 BC [148, 791, 1198].
- Kriegeria enterochroma* (Pk.) Seav. (*Chloroscypha jacksoni* Seav.): on 1 Ont [979].
- Lentinus lepideus* Fr.: on 3 BC [1198].
- Lenzites saepiaria* (Wulf. ex Fr.) Fr.: brown cubical rot, carie brune cubique: on 3 BC [148, 1198].
- Limacinia alaskensis* Sacc. & Scalia: on 3 BC [51, 1198].
- Lophiostoma thujae* Ell. & Ev.: on 1 Que [53].
- Lophodermium thujae* Davis: on 1 Ont [236], NB F60:33.
- Marasmius scorodonius* Fr.: on 3 BC [148].
- Merulius fugax* Fr.: on 3 BC [148, 1198].
- M. lacrymans* Wulf. ex Fr.: on 3 BC [1198]; see *Abies*.
- Mitrula phalloides* Bull. ex Chev.: on 3 BC [1199].
- Mycena griseoconica* Kauffm.: on 3 BC [148].
- Mytilidion thujarum* (Cke. & Pk.) Lohman: on 1 Man [93, p. 43].
- Naematoloma capnoides* (Fr.) Karst. (*Hypholoma c.* Fr.): on 3 BC [148, 1198].
- N. fasciculare* (Huds. ex Fr.) Karst. (*Hypholoma f.* (Huds. ex Fr.) Quél.): on 3 BC [148, 1198].
- Odontia alutacea* (Fr.) Bres.: on 1 Man [93, p. 80]; on 3 BC [148, 1198].
- O. alutacea* ssp. *?floccosa* Bourd. & Galz.: on 3 BC [148].
- O. aspera* (Fr.) Bourd.: on 3 BC [148, 1198].
- O. bicolor* (Alb. & Schw. ex Fr.) Quél.: white stringy rot, carie blanche filandreuse: from 1 NB NS F53:22; on 3 BC [792, 1198].
- O. lactea* Karst.: on 3 BC [148, 1198].
- Panus rudis* Fr.: on 3 BC [1198].
- Patellaria atrata* (Hedw.) Fr.: on 3 BC [1198].
- Paxillus panuoides* Fr.: on 3 BC [1198].
- Pellicularia subcoronata* (Höhn. & Litsch.) Rogers: on 3 BC [1198]; see *Abies*.
- P. vaga* (Berk. & Curt.) Rogers (*Corticium vagum* Berk. & Curt.): on 1 Man [93, p. 76]; on 3 BC [1198]; see *Acer*.
- Peniophora byssoides* (Pers. ex Fr.) Bres.: on 3 BC [1198]; see *Abies*.
- P. carnosa* Burt: on 3 BC [1198].
- P. crassa* Burt ex Pk. and *P. flavoferruginea* (Karst.) Litsch.: on 3 BC [148, 1198].
- P. gracillima* Ell. & Ev. and *P. greschickii* (Bres.) Bourd. & Galz.: on 3 BC [1198]; see *Abies*.
- P. hamata* Jackson: on 1 Ont [493, p. 133]; see *Abies*.
- P. humifaciens* Burt: on 3 BC [1198].
- P. laeta* Jackson: on 1 Ont [493, p. 130].
- P. pallidula* (Bres.) Bres.: on 3 BC [1198]; see *Abies*.
- P. sambuci* (Pers.) Burt: on 3 BC [1198]; see *Acer*.
- P. sanguinea* (Fr.) Höhn. & Litsch.: on 3 BC [148, 198].
- P. separans* Burt: on 3 BC [793]; see *Abies*.
- P. tenuis* (Pat.) Massee: on 3 BC [1198]; see *Abies*.
- P. ?velutina* (Fr.) Cke.: on 3 BC [148].
- Pestalotia funerea* Desm.: on 1 Ont 48:102, NB F56:26.
- Phlebia albida* v. Post ex Fr. (*P. mellea* Overh.): on 3 BC [148, 1198].
- Phomopsis juniperovora* Hahn: blight, brûlure phomopsienne: on 1 Ont 40:87.
- Pithya cupressi* (Batsch) Rehm: on 3 BC [1198].
- Pleurotus applicatus* Fr.: on logs of *T.* sp. Man [93, p. 93].
- Polyporus abietinus* Dicks. ex Fr.: on 1 Ont F55:62; on and from 3 BC [148, 1198].
- P. balsameus* Pk.: brown cubical rot, carie brune cubique: on 1 Canada 33:85; on and from 3 BC [148, 1198].
- P. caesius* Schrad. ex Fr.: on 3 BC [148, 1198].
- P. cuneatus* (Murr.) Zeller: on and from 3 BC [148, 1198], Alaska [175, 555].
- P. dichrous* Fr. and *P. elegans* Bull. ex Fr.: on 3 BC [148, 1198].
- P. hirsutus* Wulf. ex Fr.: on 1 Ont [795]; on and from 3 BC [148, 1198].
- P. immitis* Pk. and *P. perennis* L. ex Fr.: on 3 BC [148, 1198].
- P. planellus* (Murr.) Overh.: on 3 BC [1198].
- P. schweinitzii* Fr.: brown cubical rot, carie brune cubique: on 1 Canada 33:85; on and from 3 BC [148, 791, 1198].
- P. semipileatus* Pk.: on and from 3 BC [148, 1198].
- P. sulphureus* Bull. ex Fr.: from 3 BC [148, 1198].
- P. undosus* Pk.: on 3 BC [148, 1198].
- P. versicolor* L. ex Fr.: on and from 3 BC [148, 1198].

Thuja

- Poria albipellucida* Baxt.: on or from 3 BC [148, 791, 1198].
- P. candidissima* (Schw.) Cke.: on 3 BC [148, 1198]; see *Abies*.
- P. cinerascens* Bres.: on 3 BC [791].
- P. ferrea* (Pers.) Bourd. & Galz.: on 3 BC [1198]; see *Acer*.
- P. ferrugineofusca* Karst.: on and from 3 Alaska [555], BC [1198].
- P. lenis* (Karst.) Sacc.: on 3 BC [148, 1198].
- P. mappa* Overh. & Lowe: on 3 BC [813].
- P. monticola* Murr.: from 3 BC [1198].
- P. nigrescens* Bres.: recorded on 3 BC [1198].
- P. sequoiae* Bonar: from 3 BC [1198].
- P. sericeomollis* (Rom.) Egel. (*P. asiatica* (Pilát) Overh.): on and from 3 BC [148, 791, 1198].
- P. subacida* (Pk.) Sacc.: white stringy rot, carie blanche filandreuse: on or from 3 BC [148, 791, 1198].
- P. subiculosa* (Pk.) Cke.: on 1 NS [1138].
- P. subincarnata* (Pk.) Murr.: on 1 NB F53:26.
- P. weirii* Murr.: yellow ring rot, carie jaune annelée: on and from 3 BC 38:94, [148, 741, 791, 1198], Alaska [175].
- P. xantha* (Fr.) Cke.: on 3 BC [1198].
- Schizophyllum commune* Fr.: on 3 BC [148].
- Scutellinia scutellata* (L. ex Fr.) Lambotte (*Patella s.* (L. ex Fr.) Morgan): on 3 BC [1199].
- Scytinostroma ochroleucum* (Bres. & Torrend) Donk (*Corticium abeunis* Burt): on 3 BC [1199].
- Sebacina (Bourdotia) rimosa* Jacks. & G. W. Martin [*Basidioidendron rimosum* (Jacks. & G. W. Martin) Luck-Allen]: on 1 Ont [673, p. 684].
- Stereum chailletii* (Pers. ex Fr.) Fr.: on 3 BC [148, 1198].
- S. purpureum* (Pers. ex Fr.) Fr. (*S. rugosiusculum* Berk. & Curt.): on 3 BC [148, 1198].
- S. sanguinolentum* (Alb. & Schw. ex Fr.) Fr.: red heart rot, carie rouge du sapin: on 3 BC [148, 791, 1198].
- Stypella papillata* Möll.: on *T. sp.* Ont [619].
- Tomentella fusca* (Fr.) Schroet.: on 3 BC [1198].
- Trametes carbonaria* (Berk. & Curt.) Overh.: on 3 BC [148, 1198].
- T. mollis* (Sommerf.) Fr.: on 3 BC [148].
- T. odorata* Fr. (*T. americana* Overh.): from 3 BC [744].
- T. tenuis* Karst. (*Poria isabellina* (Fr.) Overh.): on or from 3 BC [148, 791, 1198].
- Trechispora brinkmanni* (Bres.) Rogers & Jacks. (*Corticium coronilla* Höhn.): white stringy rot, carie blanche filandreuse: on 3 BC [148, 1198]; see *Abies*.
- Tremella simplex* Jacks. & G. W. Martin: on *Aleurodiscus* sp. on 1 Ont Que [673, p. 688].
- Vararia pallescens* (Schw.) Rogers & Jacks.: on 3 BC [1198].
- V. racemosa* (Burt) Rogers & Jacks. (*Corticium racemosum* (Schw.) Burt): on 3 BC [148, 1198].
- Xeromphalina campanella* (Batsch ex Fr.) Kühner & Maire (*Onophalia c.* (Batsch ex Fr.) Qué.): on and from 3 BC [148, 791, 1198].
- Winter injury: on 1 Ont NB 37:71, Que 36:121; on 3 BC 58:110.

Thymus L.

LABIATAE

Low perennial herbs, mostly of the Old World.

1. *T. serpyllum* L., creeping thyme, thym; naturalized from Europe in NS, Que and Ont.

Other host: 2, *T. officinalis*.

Low-temperature basidiomycete, basidiomycète frigidophile: isolated from naturally infected 1 Alta [215].

Botrytis cinerea Pers.: on 2 Alaska [175].

Mycosphaerella tassiana (de Not.) Johans. (*Sphaerella pachyasca* Rostr.): on 1 Greenl [899].

Puccinia schneideri Schroet.: III on 1 Greenl [15, p. 331; 900].

Tiareella L.

SAXIFRAGACEAE

Perennial herbs of temperate N. America and Asia.

1. *T. cordifolia* L.; in Canada from NS and NB to Ont.
2. *T. trifoliata* L.; Alaska to Ore; also in e. Asia.
3. *T. unifoliata* Hook.; Alaska, Alta and BC to Calif.

Ceratobasidium anceps (Bres. & Syd.) Jackson: on 1 Que [495].

Puccinia heucherae (Schw.) Diet.: III on 1 Ont Que, 2 Alaska, 3 BC [15, p. 293]; on 2, 3 Alaska [175].

P. heucherae var. *heucherae*: III on 1 Ont, 3 BC [954; cf. 828].

Sphaerotheca fuliginea (Schlecht.) Poll. (*S. macularis* (Fr.) Magn. var. *f.* (Fr.) W. B. Cke.): on 2 Alaska [175].

Tilia L.

TILIACEAE

Trees of the north temperate region.

1. *T. americana* L. (*T. glabra* Vent.), basswood, bois blanc; in Canada from NB to Man. Basswood is one of the softest and lightest of Canadian hardwoods; it is valued for hand carving, modelling and interior trim and for food containers.
2. *T. cordata* Mill., small-leaved linden, tilleul; Europe.
3. × *T. europea* (*T. vulgaris* Hyne, *T. cordata* × *T. platyphyllos*), common linden, tilleul; Europe.
4. *T. platyphyllos* Scop., large-leaved linden, tilleul de Hollande; Europe.
5. *T. tomentosa* Moench; Europe and w. Asia.

Cercospora microsora Sacc.: leaf spot, tache des feuilles: on *T. sp.* Man 42:95; on 1 Ont 25:62, Que 55:118, NS 52:107, 61:108, [1138], PEI 32:82; on 2 NS 48:102; on 3 NS 55:118.

Cladosporium sp.: on 3 BC [1198].

Collybia velutipes (Curt. ex Fr.) Kummer: white spongy rot, carie blanche spongieuse: from *T. sp.* Ont [791].

Corticium confluens (Fr.) Fr.: on dead limbs of ?1 Man [93, p. 75].

Corticium litschaueri Burt (*C. septentrionale* Burt): on 1 Man [93, p. 76].
Cyphella tiliae (Pk.) Cke.: on dead branches of 1 Man [93].
Diaporthe tiliae (Ell.) Höhn.: on 1 Ont F63:69.
Dinemasporium robiniae Gerard: on 1 Man [93, p. 133].
Elsinoë tiliae Creelman: anthracnose, anthracnose: on 3, 4 NS 54:127, 55:118, [228, p. 556].
Fomes ignarius (L. ex Fr.) Kickx: white trunk rot, carie blanche du tronc: on 1 Ont F54:72, F55:59.
Fungi isolated from submerged wood: of 1 NB NS Alaska [726]; see *Helicoma* spp., p. 202.
Fusarium avenaceum (Fr.) Sacc.: on twigs of 1 Man [93, p. 117].
Ganoderma applanatum (Pers. ex Wallr.) Pat. (*Fomes applanatus* (Pers. ex Wallr.) Gill.): white mottled rot, carie blanche spongieuse: on 1 Canada 33:92.
Gloeosporium tiliae Oud. [*Discula quercina* (West.) Arx]: anthracnose, anthracnose: on 1 Que 41:108, NS [1138], PEI 24:48, 58:110; on ? 1 NB PEI F56:26; on 2 NS 55:118, Nfld 61:108; on 3 NS 33:62, 124, PEI 61:108; on 5 PEI 54:127.
Gnomonia tiliae Oud.: on *T.* sp. NB F63:37.
Helmisporium tiliae (Lk.) Fr. (*Exosporium t.* Lk.): on dead branches of 1 Man [93, p. 117].
Hypoxylon rubiginosum Pers. ex Fr.: on dead 1 Man [93, p. 60].
Lachnella tiliae (Pk.) W. B. Cke.: on 1 Ont F62:70.
Massariella curreyi (Tul.) Sacc.: on branches of 1 Man [93, p. 56].
Naematelia nucleata (Schw.) Fr.: on dead branches of 1 Man [93, p. 74].
Nectria cinnabarina Tode ex Fr.: on 1 Alaska [175]; on 2 NS 52:107.
Orbilbia chrysocoma (Bull.) Sacc.: on dead 1 Man [93, p. 41].
Peniophora mutata (Pk.) Höhn. & Litsch.: on *T.* sp. Ont Que, 1 Que [705]; see *Acer*.
P. nuda (Fr.) Bres.: on bark of 1 Man [93, p. 78].
Phoma communis Rob.: on 1 Alaska [175].
Phomopsis sp.: twig dieback, dépérissement: on 3 NS 55:118.
Phyllosticta tiliae Sacc. & Speg.: on 1 Man [93, p. 136].
Platyglloe peniophorae Bourd. & Galz.: on *T.* sp. Ont [673].
Polyporus adustus Willd. ex Fr.: from 1 Ont [791].
P. hirsutus Wulf. ex Fr.: on *T.* sp. NB F53:26; on 1 Ont [795].
Sphaeropsis olivacea Otth: on branches of 1 Man [93, p. 140].
Uncinula clintonii Pk.: powdery mildew, blanc: on 1 Ont 25:62, Que 31:125.

Tofieldia Huds.

LILIACEAE

Slender perennials of the northern hemisphere and the Andes.

1. *T. coccinea* Richards.; Greenl to Alaska; also in Asia.
2. *T. glutinosa* (Michx.) Pers.; in Canada from Nfld and NS to Man.
3. *T. pusilla* (Michx.) Pers., (*T. palustris* auct. Am., *T. borealis* Wahlenb.), Scotch asodel; Greenl, Nfld and Que to Alaska and BC.

Cladosporium herbarum (Pers.) Lk.: on 1 Greenl [901].
Hendersonia luzulae West.: on 3 Greenl [900].
Metasphaeria borealis Rostr.: on 3 Greenl [899, p. 561].
Microsticta vagans Desm.: on 3 Greenl [899].
Mycosphaerella minor (Karst.) Johans.: on 3 Frank [52].
M. tassiana (de Not.) Johans. (*Sphaerella t.* de Not.): on 2 BC [52]; on 3 Greenl [899, 901].
M. tassiana var. *arthopyrenioides* (Auersw.) Barr: on 3 Frank [52].
M. tassiana var. *tassiana*: on 3 Que [52].
Phoma tofieldiae Rostr.: on 3 Greenl [899].
Pleospora herbarum (Fr.) Rabh.: on 3 Greenl [899].
P. herbarum var. *occidentalis* Wehm.: on 1 BC [50].
P. kansensis Ell. & Ev.: on 3 Frank [52].
P. oligomera Sacc.: on 1 Greenl [900].
P. penicillus (Schm.) Fckl. var. *p.* (*Pyrenophora chryso-spora* (Niessl) Sacc.): on 3 Greenl [604].
P. scrophulariae (Desm.) Höhn.: on 3 Frank [52].
Selenophoma drabae (Fckl.) Petr. (*Septoria semilunaris* Johans.): on 3 Greenl [900].
Septoria orchidearum West.: on 3 Alaska [175, 604].

Tolmiea Torr. & Gray SAXIFRAGACEAE

A single species.

1. *T. menziesii* (Pursh) Torr. & Gray; Alaska and BC to Ore and Calif.
- Puccinia heucherae* (Schw.) Diet. var. *heucherae*: III on 1 Alaska [175], BC [954, 1198, 1203; cf. 15, p. 292].

Tradescantia L. COMMELINACEAE

Perennial plants of temperate and tropical America.

1. *T. fluminensis* Vell, wandering jew; native to S. America.
2. *T. virginiana* L., spiderwort; Conn to Wis and s. US, reported for s. Ont; cult. as a border plant.

Botrytis cinerea Pers.: on *T.* sp. Alaska [175].
Fusarium solani (Mart.) App. & Wr.: isolated from decayed cuttings of 1 Man [335].

Tragopogon L. COMPOSITAE

Stout biennial or perennial herbs of the Old World.

1. *T. dubius* Scop.; a common weed in the prairies and now invading Ont and Que.
2. *T. pratensis* L., goat's beard, salsifis blanc; common in E. Canada.
3. *T. porrifolius* L., salsify or oyster plant, salsifis; escaped from cult. from NS to Ont in Canada.

Albugo tragopogonis Pers. ex S.F.Gray (*Cystopus cubicus* (Strauss) Lév.): white rust, albugine: on 1, 3 Sask [93, p. 29]; on 3 BC 35:39, Sask 39:59, Que 25:56, 32:109, 41:52.

Tragopogon

Sclerotinia sclerotiorum (Lib.) de Bary: sclerotinia rot, pourriture sclérotique: on 3 NS 32:51.

Aster yellows virus: aster yellows, jaunisse de l'aster: on 3 NB 30:86, 33:35.

Trautvetteria Fisch. & Mey.

RANUNCULACEAE

Erect perennial herbs of the northern hemisphere.

1. *T. grandis* Nutt.; BC to Calif.

Puccinia pulsatillae Kalchbr.: III on 1 BC [15, p. 184; 535].

Ramularia trautvetteriae Shaw & Sprague: on 1 Alaska [983, p. 175].

Trientalis L.

PRIMULACEAE

Low perennial herbs of Eurasia and N. America.

1. *T. arctica* Fisch., chickweed wintergreen; Alaska and Alta to Ore; also in e. Asia.
2. *T. borealis* Raf. (*T. americana* Pursh), star flower; Labr, Nfld and NS to Alta.
3. *T. latifolia* Hook., Indian potato; BC to Wash and Calif.

Ceratobasidium anceps (Bres. & Syd.) Jackson: on 2 Ont Que [495].

Mycosphaerella tassiana (de Not.) Johans. var. *arctica* (Rostr.) Barr: on 2 Que [52].

Puccinia caricina DC. var. *limosae* (Magn.) Jørstad (*P. karelica* Tranz.): 0 I on 1 Alaska [175], BC [1198]; on 2 Ont [828], NS [15, p. 214; 1138].

Ramularia ?magnusiana (Sacc.) Lindau: on leaves of 2 Man [93, p. 125].

Septoria increscens Pk.: on 2 Man [93, p. 138], Ont 24:82, Que [197].

Tubercinia trientalis Berk. & Br.: on 1 Alaska [175, 292]; on 2 Ont [292]; on 3 BC [292, 535, 1198].

Trifolium L.

LEGUMINOSAE

Annual or perennial herbs of temperate regions; some are important forage plants and others are weeds.

1. *T. agrarium* L., yellow clover, trèfle jaune; naturalized from Europe and now in Alta, Ont and Que.
2. *T. dubium* Sibth., hop clover; naturalized from Europe; in Canada in Ont, Alta and BC.
3. *T. fragiferum* L., strawberry clover, trèfle fraiser; adventive from Europe but apparently not escaped in Canada.
4. *T. hybridum* L., alsike clover, trèfle alsike; introduced from Europe, much cult. and escaped from Nfld to BC.

5. *T. incarnatum* L., crimson clover, farouche; introduced from Europe, cult. and occasionally escaped.

6. *T. medium* L., zig-zag clover; naturalized from Europe and locally escaped in Que and NB.

7. *T. microdon* Hook. & Arn., cup clover; BC to Calif; also in Chile.

8. *T. oliganthum* Steud.; BC to Calif.

9. *T. pratense* L., red clover, trèfle rouge; naturalized from Europe, and now from Labr to BC; less common than 9a *T. p.* var. *sativum* (Mill.) Schreb., cultivated red clover, trèfle rouge cultivé; extensively and widely naturalized.

10. *T. procumbens* L., hop clover, trèfle jaune; naturalized from Europe and now in NS, Que and Ont.

11. *T. repens* L., white clover, trèfle blanc; cult. and naturalized from Europe.

12. *T. subterraneum* L., subterranean clover, trèfle souterrain; native to the Mediterranean region; cult., mainly in Ore and Wash.

13. *T. wormskjoldii* Lehm. (*T. fimbriatum* Lindl.); BC to Calif.

Ascochyta meliloti (Trel.) Davis: black stem, tige noire: on 9 Que 57:31; see *Melilotus*.

Low-temperature basidiomycete, basidiomycète frigophile: winter crown rot, pourridié hivernal: a destructive disease particularly in Alta and Sask in seasons when the soil is still unfrozen when the first permanent snow falls; on 4 Alta 42:20; on 9 BC 55:35, Alta Sask 46:20; from 11 Alta 46:20. Of the three main cult. species, 11 is often severely injured in Alta and Sask, 4 is frequently injured and individual plants are killed in Alta [215]. 4 was shown to be extremely susceptible, 3 and 11 very susceptible, and 9 moderately susceptible. The cultivar Siberian is noticeably resistant, but very susceptible to *Kabatiella caulivora* (q.v.) [217].

Cercospora zebrina Pers.: leaf spot, rayure nervale: on 4 Alta 44:22, Man 29:79, 34:21, Que 39:27; on 4 Sask Man, 11 Man [93, p. 115]; on 9 Alta NS 55:35, Ont 47:26, 50:30, Que 39:27; on 11 Alta 52:27, Man 24:82, 55:35.

Colletotrichum destructivum O'Gara: anthracnose, anthracnose: on 9 Ont 52:27, cf. 53:30.

C. graminicola (Ces.) G. W. Wils.: anthracnose, anthracnose: on 9 Que 52:27, 54:36.

Cylindrocarpon ehrenbergii Wr., etc.: root rot, chancre des racines: on 4 Alta 42:20; on 9 Alta 41:18, Sask 62:39; on 11 Alta 41:18.

Cymadothea trifolii (Pers. ex Fr.) Wolf (*Phyllachora t.* (Pers.) Bayl.-Elliott & Stansf. [*Mycosphaerella kilianii* Petr.]; stat. conid. *Polythrincium t.* Kze.): sooty blotch, tache de suie: on *T. spp.* BC [50]; on 4 BC [535], Alta Sask 31:26, 126, Sask Man [93, p. 124], Ont 49:26, Que 29:20, NS 32:27, [1138], PEI 54:36, Nfld 49:xx, 50:30; on 9 BC 35:16, [535], Alta 47:26, Ont 23:31, Que 39:26, NS 31:26, [1138], PEI 34:20, Nfld 57:31; on 11 Alaska [175], BC 37:16, [1203], Sask Man [93], Ont 48:20, Que

- 29:20, NB 60:85; on 13 BC [535, 1203]. The disease is common but it causes little apparent damage.
- Didymella trifolii* (Fckl.) Sacc.: on stem of *T. sp.* BC [50].
- Didymium squamulosum* (Alb. & Schw.) Fr.: on 4 Que 39:27.
- Erysiphe polygoni* DC. ex Méral: powdery mildew, blanc: on *T. spp.* BC [50], Man-NB PEI 22:19, Sask-PEI 23:29, Alta 26:7; on 4 BC 31:25, Alta 41:18, Ont 48:20, Que 35:16; on 9 BC 29:20, [535], Alta Man 36:15, Sask 45:26, Sask Man [93, p. 44], Ont 34:19, Que NB NS 31:25, NB PEI [1138], PEI 30:30; on 11 Ont 48:20, Que 29:20. An epidemic occurred in 1921-24, 24:15.
- Undoubtedly 9 is the principal host and may be severely attacked late in the season. Although seed production may not be seriously affected the value of the plant as pasture or hay may be reduced.
- Fungi from seed:** of 4 and/or 9: *Acremoniella atra* (Cda.) Sacc., 4 Denmark Sweden; *Alternaria tenuis* auct. sensu Wiltshire, *Botrytis cinerea* Pers., 4 Ont [374]. *Chaetomium cochliodes* Pall., 9 Que [1009]. *C. elatum* Kze. & Schm., *C. globosum* Kze., 4 Ont; *Cladosporium cladosporioides* (Fres.) De Vries, 4 Ont, 9 BC; *C. herbarum* Lk., 9 Que; *Epicoccum nigrum* Lk., 9 Ont [374]. *Fusarium acuminatum* Ell. & Ev., 4 BC Ont; *F. avenaceum* (Fr.) Sacc., 4 Ont, 9 BC; *F. equiseti* (Cda.) Sacc., 4 Ont, 9 Ont Que; *F. graminearum* Schwabe, 9 Ont; *F. moniliforme* Sheldon, 4 Ont; *F. oxysporum* Schlecht., 4 Alta; *F. poae* (Pk.) Wr., 4 Ont, 9 Man Que [334]. *Gonatobotrys simplex* Cda., 9 Ont; *Papularia sphaerosperma* (Pers.) Höhn, *Sordaria fimicola* (Rob.) Ces. & de Not., 4 Ont; *Stemphylium botryosum* Wallr., 4 Ont, 9 Ont Que; *S. sarcinaeforme* (Cav.) Wiltshire, 9 Ont Que; *Trichoderma viride* Pers., 4, 9 Ont; *Trichothecium roseum* (Pers.) Lk., 9 Que [374].
- Fusarium spp.*: root rot, pourridié fusarien: *F. spp.* on 9 Ont 44:50; *F. acuminatum* Ell. & Ev. from 9 Que 55:35; *F. avenaceum* (Fr.) Sacc. from *T. spp.* Alta 46:21; *F. avenaceum* moderately infected roots of 4, 9, 11 in summer and winter tests, whereas *F. culmorum* (W. G. Sm.) Sacc. was pathogenic to roots of these clovers in summer, when it caused more damage than *F. avenaceum* [211].
- Fusarium spp.*: from decayed tissues of *T. spp.*: *F. acuminatum*, 9 Que; *F. arthrosporioides* Sherb., 11 Ont; *F. avenaceum*, 9 Ont Que, 11 Ont; *F. oxysporum* Schlecht., 4 BC, 9 Ont; *F. poae* (Pk.) Wr., 9 Ont Que; *F. solani* (Mart.) App. & Wr., 9 Ont Que [335].
- Gloeosporium spadiceum* Dearn. & Bisby [*Sporonema s.* (Dearn. & Bisby) Arx, 15a, p. 137]: leaf spot, anthracnose noire: on 9 Alta 39:26, 44:22, Sask 46:21, Man 38:19, [93, p. 130], Que 47:26, 54:36.
- Kabatiella caulivora* (Kirchn.) Karak. (*Gloeosporium caulivorum* Kirchn.): northern anthracnose, anthracnose septentrionale: on *T. sp.* Ont 24:16, 45:26, Que 25:18, PEI 36:15; on 9 Alta 32:27, Sask 54:27, Que 56:30, NB 42:20, 60:86, [1138], NS 51:24, Nfld 57:32. The disease is of considerable importance in n. Alta and n. Sask and possibly in some seasons in E. Canada. Growth of the fungus in culture has been investigated [195].
- Leptosphaeria pratensis* Sacc. & Briard (stat. conid. *Stagonospora meliloti* (Lasch) Petr.): on *T. sp.* Alta 34:20; on 4 Alta 40:21, 44:22, Sask 46:21, Man [93, p. 1401, Ont 38:19, Que 35:16; on 11 Alaska [175], BC (as *S. recedens*) [535].
- Mycosphaerella carinthiaca* Jaap: mid-vein spot, tache médiane: in 1936 on 9 NB 37:15, 42:20 [1138]; not recorded since.
- Peronospora trifoliorum* de Bary: downy mildew, mildiou: on *T. spp.* Alta 31:26, Que 30:30, PEI 25:18, 29:21, [1138]; on 2 BC [535]; on 9 PEI 31:26.
- Phoma ?trifolii* E. M. Johnson & Valteau: black stem, tige noire: on 4 Alta 62:39.
- Plenodomus meliloti* Dearn. & Sanford: brown root rot, pourridié-plénodome: on *T. sp.* Alta 28:28, Alta Sask [925]; on 4 Alaska [592], Alta 50:30; on 9 Alta 33:16, Yukon [592]; see *Melilotus*.
- Pleospora herbarum* (Fr.) Rabh.: on *T. spp.* BC [50].
- Pratylenchus penetrans* (Cobb) Filip. & Stekh.: root-lesion nematode, nématose des racines: on 9 Ont 61:357.
- Pseudomonas syringae* van Hall: bacterial leaf spot, tache bactérienne: on 9 Ont 44:23, 45:26, PEI 58:33.
- Pseudopeziza trifolii* (Biv.-Bern.) Fckl. sensu lat.: common leaf spot, tache commune: on *T. spp.* BC Ont-PEI 24:16, Alta 31:26.
- P. trifolii* f. sp. *trifolii* (*P. t.* f. sp. *trifolii-repentis* Schüepp): on 4 Alta 52:28, Man 44:23, Ont 50:30, Que 58:33; on 11 BC [535, 1203], Sask 50:30, Que 48:20.
- P. trifolii* f. sp. *trifolii-pratensis* Schüepp. (*P. trifolii*): on 9 Alaska [175], BC 41:18, [535], BC NS PEI 31:26, Alta 52:28, Ont 47:27, Que 35:16, NB 42:20, NS 54:36, NB NS [1138].
- Pseudoplea trifolii* (Rostr.) Petr. (*Sphaerulina t.* Rostr.): pepper spot, tacheture noire: on *T. sp.* Alaska [175]; on 4 Sask [93, p. 53]; on 9 Man 55:35; see *Medicago*; the correct name appears to be *Leptosphaerulina t.* (Rostr.) Petr.
- Rhizoctonia solani* Kühn: stunt, nanisme: strains of the fungus pathogenic to 4 and 9 found in Essex Co., Ont [65].
- Sclerotinia sativa* Drayton & Groves: sclerotinia rot, pourridié sclérotique: this important pathogen of *Medicago* and *Melilotus* in Alta is not recorded on *Trifolium*; however, in field tests in Alta, Cormack [214] found that 9 was lightly to moderately susceptible and 4 slightly so.
- S. sclerotiorum* (Lib.) de Bary: sclerotinia stem rot, pourriture sclérotique: on *T. sp.* BC 38:19, 62:39; on 9 Man [93, p. 42].
- S. trifoliorum* Erikss.: sclerotinia wilt, flétrissure sclérotique: on *T. spp.* BC Man Ont 24:16; on 2 BC 53:35, [535]; on 4 Ont 47:27; on 9 BC [535], Ont 42:20, 47:27, Que 38:19; on 11 Ont 49:23; on 13 BC [535]. Although this pathogen was reported on *T. spp.* from Alta, 25:17, Cormack [214] reported that he had never encountered it in that province. See also under *Medicago*.
- Stagonospora recedens* (O. Massal.) Jones & Weimer: leaf spot, tache stagonosporéenne: on 9 BC 41:18, [535], Alta 29:26, Man 44:23, Ont 38:19, Que 45:27.
- Stemphylium botryosum* Wallr.: leaf spot, tache stemphyllienne: on 9 Alta 55:36, Nfld 57:32.
- S. sarcinaeforme* (Cav.) Wiltshire: target spot, tache zonée: on 9 BC 42:20, [535], Alta 54:36, Sask 57:32, Man 55:36, Ont 45:27, 48:20, Que 38:20, [479], NS [1138], PEI 52:28, Nfld 61:51; not uncommon.
- Uromyces fallens* Kern. (*U. trifolii* (Hedw.f. ex DC.) Lév.): rust, rouille: on 5 BC [535], NS [1138], PEI 37:16; on 6 Man [93, p. 73]; on 9 BC Man Ont Que NS [15, p. 304], BC 31:25, [535, 1198], Man 44:23, Ont NB 33:15, Que 35:16, NB NS PEI [1138], NS 29:19, PEI 31:25.
- U. minor* Schroet.: I III on 2 BC 47:27, [535, 1198]; on 7 BC 47:27, [15, p. 306]; on 8 BC [15].
- U. nerviphilus* (Grognot) Hotson: vein rust, rouille des

Trifolium

nervures: 0 I III on 11 BC [1199], Ont [15, p. 305]; on 11 Man, ? on 4 Sask [93, p. 73].

Uromyces striatus Schroet.: II III on 10 Ont, associated with 0 I on *Esula* [829].

U. trifolii (Hedw.f. ex DC.) Lév. (*U. t.* var. *hybridi* (W. H. Davis) Arth., *U. t.* var. *trifolii-repentis* (Liro) Arth.): on 4 BC 34:20, Alta Sask Man [93, p. 73], Alta Sask NS 31:25, Man 37:16, Ont 30:30, [15, p. 304], Que 32:109, 35:16, NB [1138], PEI 32:27, Nfld 49:xx, 50:30; on 11 BC 34:20, [535], Alta 32:26, Sask 46:21, Man 20:16, Man Ont [15], Que 35:16, [197], NS [1138], PEI 33:15; probably on 12 BC [535]. The rust on 4 was shown to be heterothallic [139].

Verticillium sp.: wilt, flétrissure verticillienne: on *T. sp.* Que 39:26.

Alfalfa mosaic virus: heavy on 11 Ladino, BC 62:40; this virus and bean yellow mosaic virus (q.v.) often accompanied natural clover yellow mosaic virus and white clover mosaic virus infections (q.v.) on *T. spp.* BC Alta [860].

Aster yellows virus: aster yellows, jaunisse d l'aster: on 9 NB 48:21, 51:25, 55:36 and (as purple top) 54:37; on 11 PEI 40:21.

Scaphytopius acutus (Say) transmitted a celery-infecting strain of AYV from infected *Vinca rosea* and *Callistephus chinensis* to periwinkle, aster and 11 Ladino. This strain was originally transmitted to periwinkle by *Macrostes fascifrons* from carrot found in the Ottawa area in 1958. *S. acutus* breeds freely on strawberry and Ladino clover in the area. This finding suggests that this vector may be important in transmitting AYV to these hosts, which are not normally frequented by *M. fascifrons*, the major vector of AYV [189].

Bean yellow mosaic virus: mosaic, mosaïque: on 4 Man 55:36; on 10 BC 62:40.

Clover phyllody virus: phyllody, phyllodie: on 4 Que 61:51, [579], NS 58:33, on 9 Que 57:32, NS 59:27, PEI 62:40; on 11 Que 56:30, NS 58:33; also as witches'-broom and floral abnormality Que 49:29, 51:25.

The disease is now common in Que NB NS and PEI; the virus was transmitted by the leafhoppers *Macrostes fascifrons* (Stål), *Aphrodes bicinctus* (Schrank) and *Scaphytopius acutus* (Say) from 11 to 11 and by *S. acutus* to 9. The relationship of CPV to aster yellows virus is discussed [188].

A yellows-type virus that appears different from CPV and AYV is recorded on 4 Alta 62:40, and 9 Alta 55:36. This virus was transmitted from a plant of 4 by *Macrostes fascifrons* to *Callistephus chinensis*. The infected asters showed phyllody and axillary growth, which gives the plants a witches'-broom appearance [fide Chiykowski].

Clover yellow mosaic virus and white clover mosaic virus: heavy on 11 BC 62:40; on *T. spp.* BC Alta [860]. CYMV and WCMV were separated from mixed natural infections by inoculation of differential hosts. CYMV is common in w. N. America and WCMV occurs in Europe, N. America and New Zealand. Strain differences occur most noticeably in CYMV isolates. Naturally occurring mixtures were found in 4, 9 and 11 BC Alta and WCMV also occurred alone in the three hosts [860].

Pea mosaic virus (pisum virus 2): mosaic, mosaïque: on 4 NB 40:21; on 9 NB 42:21.

Pea mottle virus (trifolium virus 1): mosaic, mosaïque: on 4 NB 42:21; on 9 NB 44:23; on 11 NB 45:27; according to Pratt [860] this virus may be equated with CYMV (q.v.)

Tobacco ringspot virus: ringspot, tache annulaire: on 9 Ont 54:37, 55:36, [66].

Virus: mosaic, mosaïque: on *T. spp.* BC Man Ont Que 24:16, Alta 31:26, NB 25:18, PEI 29:21; on 1 NB 26:40; on 4 BC 59:27, Alta 52:28, Que 62:40, [579]; on 5 BC 55:36; on 9 BC 34:20, Sask 42:21, Man 38:15, Ont 25:18, 34:20, Que NB 35:16, PEI 32:26; on 11 BC 29:21, [535], NB 38:15, PEI 61:50.

Virus: witches'-broom, virose-balai de sorcière: on *T. sp.* BC 32:27, 48:21; on 4 BC 49:24, 53:35; on 9 BC 49:24, Alta 47:27; on 11 BC 53:35.

Boron deficiency, carence de bore: reddening, rougissure: on *T. sp.* Yukon 53:35; on 4, 9 Que 52:29, 53:32; see *Medicago*.

Low temperature, basse temperature: winter injury, gelure: on *T. spp.* Alta 52:28, Sask 51:25, Que 50:31, PEI 39:26; on 9 BC Alta 53:35, Que 58:33; on 11 Que 57:33.

Potassium deficiency, carence de potasse: chlorosis, chlorose: on *T. sp.* PEI 41:18; on 4 Que 62:40; on 9 PEI 42:21.

Soil alkalinity: leaf chlorosis and wilting, chlorose et flétrissure: on 9 Lacombe, Alta; because chlorine ions in the presence of added barium or sodium, but not calcium ions, caused chlorosis, the observed symptoms were attributed to soil alkalinity, 56:30, [477].

Triglochin L.

JUNCAGINACEAE

Perennial herbs of nearly cosmopolitan range.

1. *T. maritima* L., seaside arrowgrass; Labr, Nfld and Que to Man, Alta and Alaska; also elsewhere.
2. *T. palustris* L., marsh arrowgrass, faux jonc; Greenl and Nfld to Man, Alta, Yukon and Alaska; also Eurasia and S. America.

Mycosphaerella juncaginacearum (Lasch) Schroet. (stat. steril. *Asteroma j.* Rabh.): on 2 Man [604], Greenl [899].

M. tassiana (de Not.) Johans.: on 2 Man [604].

Pleospora herbarum (Fr.) Rabh. (*P. maritima* Rehm): on 2 Man [604].

Trillium L.

LILIACEAE

Low perennial herbs of temperate N. America and e. Asia.

1. *T. cernuum* L., sugar berry; Nfld, NS and Que to Ont.
2. *T. grandiflorum* (Michx.) Salisb., white trillium, pâquerette; in Canada in s. Que and s. Ont.
3. *T. ovatum* Pursh; BC to Mont, Ore and Calif.

Certobasidium anceps (Bres. & Syd.) Jackson: on *T. sp.* Que; on 1 Ont [495].

Ciborinia trillii Batra & Korf: sclerotia of the fungus on 2 Ont [60].

Urocystis trillii Jackson: on 2 Que [292]; on 3 BC [535].

Triodia R.Br.

GRAMINEAE

Perennial grasses of America and Australia.

1. *T. flava* (L.) Smyth.

Puccinia windsoriae Schw.: II III on 1 Ont [15, p. 161]; as the host of this rust is unknown to occur in Canada (fide W. G. Dore) and no specimen now exists in the Dearness Herbarium [828], the record is doubtful.

Trisetum L.

GRAMINEAE

Tufted perennial grasses of cool and temperate regions.

1. *T. cernuum* Trin.; Alaska and Alta to Calif.
2. *T. spicatum* (L.) Richter (including *T. subspicatum* (L.) Beauv.); arctic N. America and Eurasia; also several varieties, including 2a, *T. s.* var. *congdoni* (Scribn. & Merr.) Hitchc. (*T. sesquiflorum* Trin.), and 2b, *T. s.* var. *maidenii* (Gandoger) Fern.

?Low-temperature basidiomycete, basidiomycète frigophile: on 2 Alaska [1042].

Bipolaris cyclops (Drechs.) Sprague (*Helminthosporium c.* Drechs.): on 2 Alaska [1037, 1038]; probably not distinct from *Podosporiella verticillata* O'Gara; see *Triticum*.

Cladosporium graminum Cda.: on 2 Greenl [601, 899].

Darluca filum (Biv.-Bern.) Cast.: on rust on 2 Alaska [1037]; on *Puccinia poae-nemoralis* on 2, 2a Alaska [1042].

Fusarium nivale (Fr.) Ces.: on 2 Alaska [1037]; *F. nivale* and *Selenophoma everhartii* (q.v.) on 1 Alaska [1042].

Gloeocercospora alaxensis Sprague: on 2 Alaska [1037, 1038].

Leptosphaeria sp.: on 2 Alaska [1038].

L. culmorum Auersw.: on 2 Greenl [901].

L. microscopica Karst.: on 2 "summits of Rocky Mts." [604].

L. ?nigricans Karst.: on 1 Alaska [1042].

L. typharum (Desm.) Karst., sensu Berl.: on 2 BC [50].

Lophodermium arundinacearum (Schrad. ex Fr.) Chev.: on 2 Alaska [1038], Greenl [899].

Mastigosporium rubricosum (Dearn. & Barth.) Nannf.: on 1 Alaska [1037, 1042].

Mycosphaerella tassiana (de Not.) Johans. (*Sphaerella t.* de Not.): on 2 BC [50], Yukon [600], Man Frank [604], Frank [250, 903], Greenl [602, 603, 899, 901, 902].

M. tulasnei (Jancz.) Lindau: on 2 Alaska [1038].

Ophiobolus graminis Sacc.: on 1 Alaska [1042].

Phaeoseptoria calamagrostidis Sprague and *P. festucae* Sprague: on 1 Alaska [1042].

Platyspora pentamera (Karst.) Wehm. (*Clathrospora p.* (Karst.) Berl.): on 2 Frank [903], Greenl [602, 603].

Pleospora sp.: on 2 Alaska [1038].

P. heleocharidis Karst.: on 2 BC [50].

P. heleocharidis var. *arctica* (Karst.) Wehm. (*P. karstenii* Sacc.): on 2 Greenl [603], Nfld [604].

P. herbarum (Fr.) Rabh.: on 2 Greenl [899].

P. herbarum var. *h.* (*P. discors* (Dur. & Mont.) Ces. & de Not.): on 2 Greenl [603].

P. vagans Niessl (*Hendersonia* state): on 1 Alaska [1042].

?*Pseudomonas coronafaciens* (Ch. Elliott) Stevens: on 1 Alaska [1042].

Puccinia monoica Arth.: II III on 2 Sask [93, p. 19; cf. 15, p. 141].

P. poae-nemoralis Otth. (*P. poae-sudeticae* (West.) Jörstad): II III on 2 Alaska [175, 1037, 1038; cf. 15, p. 150].

P. recondita Rob. ex Desm. (*P. rubigo-vera* Wint.): II III on 2 Alaska [175, 1037], Yukon [1042; cf. 15, p. 177].

Pyrenochaeta terrestris (Hans.) Gorenz, Walker & Larson: on 2 Alaska [1037].

Pythium debaryanum Hesse: on 2 Alaska [1037].

Ramularia pusilla Ung.: on *Puccinia poae-nemoralis* on 2 Alaska [1042].

Rhizoctonia solani Kühn: on 2 Alaska [1037].

Selenophoma donacis (Pass.) Sprague & Johnson var. *stomaticola* (Bäum.) Sprague & Johnson: on 2 Alaska [1037].

S. drabae (Fckl.) Petr. (*Septoria nebulosa* Rostr.): on 2 Greenl [899].

S. everhartii (Sacc. & Syd.) Sprague & Johnson: on 1 Alaska [1042]; on 2 Alaska [1037], Greenl [899, 1038].

Septoria calamagrostidis (Lib.) Sacc.: on 1 Alaska [1037]; on 2 Alaska [1037, 1038].

S. gramineum Desm.: on 2 Greenl [899].

Urocystis agropyri (Preuss) Schroet.: on 2b Keew [292, 953].

Triticum L.

GRAMINEAE

Annual or biennial grasses of the Mediterranean region and w. Asia.

1. *T. aestivum* L., common wheat, blé; one of the most important food plants of man. In Canada the average annual production is almost 500 million bushels.
2. *T. compactum* Host, club wheat.
3. *T. dicoccoides* Koern.; e. Mediterranean.
4. *T. dicoccum* Schrank, emmer, amidonnier.
5. *T. durum* Desf., durum wheat, blé dur. In Canada the annual production may reach 50 million bushels; the flour is used primarily for making macaroni and spaghetti.
6. *T. monococcum* L., einkorn, engrain.
7. *T. polonicum* L., Polish wheat, blé de Pologne.
8. *T. spelta* L., spelt, épeautre.
9. *T. turgidum* L., poulard wheat, poulard.

Alternaria tenuis auct., sensu Wiltshire, etc.: head discoloration, mélanose: on 1 Alta 26:3, Sask Man Que 38:8, Man 37:7, BC Man-PEI, especially Que-PEI 39:10, [cf. 1138]. In order of prevalence fungi associated with head discoloration were: *A. tenuis*, *Aureobasidium pullulans* (de Bary) Arn., *Cladosporium ?herbarum* Lk., *Epicoccum nigrum* Lk., *Bipolaris sorokiniana* (Sacc. in Sorok.) Shoem.,

Macrosporium sp. [*Stemphylium botryosum* Wallr.], 39:10, [cf. 638]. *A. tenuis* was associated with a form of black chaff, glume noire, not caused by bacteria [395] and was the predominant isolate from kernels of 1 and 5 affected by black point Man 62:30.

In most years *A. spp.* (*A. tenuis* and *A. peglioni* Curzi) were isolated more frequently than *Bipolaris sorokiniana* (q.v.) from kernels affected by kernel smudge, but unlike the latter fungus they did not affect, to any extent, seed germination, plant emergence, intensity of root rot and yield of the subsequent crop. Kernel smudge was more prevalent than usual in 1940, when the percentage of ears affected were: Man 7.6, Sask 2.4, and Alta a trace, and its level varied widely with the cultivar, 40:2.

A. ?tenuis colonizes seed of 1 held in soil that contains less moisture than required for germination. Similarly the 'storage fungi' *Aspergillus*, *Penicillium* and *Mucor* spp. are also active, and upon moisture being supplied, germination is appreciably reduced. Injury is pronounced in seed when the seed coat is cracked during threshing, a common occurrence in samples of plump seed. The value of treating the seed is yet to be fully explored [1122].

Anguina tritici (Steinb.) Filip.: ear cockle: in seed of 1 from Kashmir; unknown in Canada, 34:8.

Aphelenchus avenae Bastian: on 1 Alta 32:10.

Ascochyta hordei Hara: on 1 Alaska [1042].

A. sorghi Sacc. (*A. graminicola* Sacc.): leaf spot, tache ascochytiq: on 1 Alta 43:1, Alta Sask 58:3; prevalent on the cultivar Chinook, Sask 61:41.

Aspergillus flavipes (Bain. & Sart.) Thom & Church: from roots of 5 and in soil Man [93, p. 112].

A. okazaki Okazaki: from kernels of 1 Sask, in soil Man [93, p. 113].

Low-temperature basidiomycete, basidiomycète frigophile: winter crown rot, pourridié hivernal: unreported on 1 but in controlled experiments it was pathogenic to winter wheat and caused severe damage [217, 218].

Bipolaris halodes (Drechs.) Shoem. (*Helminthosporium h.* Drechs.): on glumes of 1 Sask 42:2, [1034].

B. sorokiniana (Sacc. in Sorok.) Shoem. (*Helminthosporium sorokinianum* Sacc. in Sorok., *H. sativum* Pamm., King & Bakke): spot blotch, head blight, etc., 'helminthosporiose': As all parts of the plant are attacked, the different phases are reported separately: Spot blotch, on 1 BC 46:1, Alta 20:15, Alta Man Ont 35:7, Sask 40:3, Man 33:6, [93, p. 120], Que 36:70; on 5 Sask Man 39:11, [93], [cf. 1034]. Head blight, on 1 BC 46:1, Alta 30:12, Sask 31:10; on 5 Ont 35:7. Black point, on 1 Alta 47:5.

Although kernel smudge is caused mainly by *Alternaria* spp. (q.v.), the cause of the more severe forms of the disease appears to be *B. sorokiniana*, 41:2. In 1935, the latter predominated in samples, especially of 5, examined in Man. Infection arises from air-borne spores, which are deposited in the largest numbers about the kernels as they are maturing. A mercurial seed dressing was beneficial [636]. In fields where seedling blight was severe, the seed lots were shown to be heavily infected Alta Man 44:2.

B. sorokiniana (*Helminthosporium sorokinianum*, *H. sativum*) and *Fusarium* spp.: common root rot, piétin commun: common root rot of spring wheat is caused primarily by *B. sorokiniana*, although *F. spp.* are also frequently isolated from affected tissues. The plants may be attacked at all ages from the seedling stage to maturity [999]. Some isolates are highly pathogenic, but they appear to be rare [939]. See above for aboveground phases.

Common root rot is widespread in the immense wheat-growing area of Alta Sask and Man; [cf. 93, p. 120]. In 1953, Sallans, 53:1, suggested that the disease was on the increase in Sask, but a comparison of the annual disease ratings for the next 8 years, 54:2 to 62:30, indicate a levelling off. The average disease rating from 1941 to 1961 was about 10.0, which closely represents the estimated annual loss.

The annual loss from common root rot in wheat in W. Canada has been estimated from time to time. For 1930-39, Greaney [631, 999] estimated the loss as: Alta 3%, Sask 9.4% and Man 5%. For 1939-41 in Man, Machacek's figure was 12.1%, 39:6, 40:2, 41:2, [631]. For 1934-43 in Sask after a detailed statistical study, Sallans [918] recorded a loss of 8.8%. He notes a significant negative correlation between disease incidence and yield. Low rainfall during June and July appears to favor increased incidence and severity. In all three provinces the crops most severely affected were those in the brown soil zone of s.e. Alta and s.w. Sask. However, the crops in the dark brown and black soil zones, which comprise most of the crop area, were also diseased, 52:1, 58:10.

In 1928-32 in Alta Sask and Man, root rot damage to wheat was reduced where wheat alternated with summerfallow or oats, where wheat followed summerfallow in other rotations or followed oats or sweet clover in a 3-year rotation, or where wheat was sown late. Damage was increased where wheat followed wheat, barley or *Agropyron trachycaulum* (q.v.) [125]. On the other hand, isolations from crowns of mature wheat plants failed to disclose any differences in the relative prevalence of *B. sorokiniana*, *Fusarium culmorum* (W. G. Sm.) Sacc. and other *F. spp.* with respect to crop sequence and crop practice. When oats preceded wheat, *B. sorokiniana* was less prevalent than *F. spp.* [126].

More recent studies, 52:2, 58:10, however, indicate no substantial reduction of root rot after summerfallow. The explanation appears to be that moldboard plowing, which buried the surface soil, has now been superceded by surface tillage, which retains crop residues in the surface layers of the soil [598].

In experiments in Man in 1936-44, root rot was reduced and yields increased by early seeding. The severity of the disease increased with the thickness and depth of seeding, particularly in some cultivars [352].

By the flotation-viability method [185, 597], soils examined in 1959, whether summerfallowed or cropped to cereals in 1958, did not differ significantly in spore population. In 1960, [187], the number of viable spores ranged from 8 to 253 per gram of soil. The disease ratings of seedlings, but not of mature plants, varied approximately as the logarithm of the spore population. Fairly good correlations were found between spore population and the frequency with which *B. sorokiniana* was isolated. *Fusarium* spp. were isolated from mature plants as the spore population of *B. sorokiniana* declined in the soil. Survival of spores of *B. sorokiniana* was greatly influenced by moisture [184]. In dry soil no decline of viability occurred, but in a saturated soil viability fell off rapidly. In cultivated fields mortality was low between fall and spring, but viable spores were substantially fewer when fields were summerfallowed for a year between wheat crops. A further study of crop rotation and common root rot of wheat [596] demonstrated that with surface tillage several nonsusceptible crops must be grown between wheat crops before root rot is substantially reduced. By this time the spore population is low. *Fusarium culmorum* seems to be more abundant on

wheat when oats are grown in the rotation. Oats, however, support *B. sorokiniana* sufficiently to be undesirable as an alternate crop in the rotation.

By amputation experiments on healthy wheat plants [1004, 1005] and excavation studies on healthy and diseased plants [1003], Simmonds and his co-workers showed that the extent and location of the lesions of the common root-rot fungi on the root system affected the plant in much the same way as did amputations. When the seminal roots or sub-crown internode are amputated while the plants are young, yield, height and tillering are reduced greatly and maturity delayed. With later amputations the damage is diminished. On the other hand, amputation of the crown roots has the greatest effect as the plants near maturity and their removal tends to induce maturity. In common root rot, both root systems are usually attacked and the symptoms are somewhat varied.

In pathogenicity studies in quartz sand, Broadfoot and Tyner [128] reported that the disease increased when the concentration of K, N, and C, but not of P, were decreased below the level of a complete nutrient solution. They [129] also describe a method that they found most satisfactory for testing the pathogenicity of *B. sorokiniana*.

Henry discovered that the natural soil microflora markedly inhibited the growth of *B. sorokiniana* in soil and the severity of infection of wheat seedlings was correspondingly reduced over that of seedlings in inoculated sterilized soil. A trace of unsterilized soil added to the sterilized soil had a pronounced inhibiting effect. Fungi are more effective as inhibitors than bacteria or actinomycetes [433]. *B. sorokiniana* grows and sporulates freely as a saprophyte on various substrata, but it does not sporulate freely in ordinary soil unless the latter is sterilized [434]. Sanford and Cormack [940] found that certain isolates of *Penicillium* and actinomycetes greatly reduced virulence of *B. sorokiniana* on wheat seedlings. Finally, Campbell [171] found that the soil fungi *Phoma humicola* Ehr., *Epicoccum nigrum* Lk. and *Trichoderma viride* Pers. strongly inhibited the pathogenic activities of *B. sorokiniana* whereas certain other named organisms were only slightly inhibitory. Antibiosis and direct parasitism were responsible for disorganization of the mycelium of the pathogen. Only those fungi that cause disruption of the mycelium were able to depress appreciably the pathogenicity of *B. sorokiniana*.

Transpiration of plants inoculated with *B. sorokiniana* was reduced during the early stages of growth, probably because of reduced area of the leaves. Later the plants tended to recover. It is suggested that the initial setback may be due to a toxin [917; cf. 621, 622]. Tissue-free extracts of *B. sorokiniana* added to crocks of nutrient solution in quartz sand inhibited the growth of wheat seedlings [1096].

Sanford [932] was one of the first to discuss the importance of antibiosis in the study of soil-borne diseases. According to Simmons et al. [1006], although common root rot occurs widely in Sask, there are wide fluctuations from field to field in the prevalence of *B. sorokiniana* and the disease. The conidia of the fungus in or on the surface of the soil or on the stubble are believed to be the source of primary infection of the crop. In the greenhouse, wheat seedlings are readily infected by a conidial suspension washed over the surface. Infection of seedlings near the soil surface permits the pathogen to enter the crown and adjacent tissues. Invasion at this point under conditions favorable for disease development may cause serious injury.

Bacteria antibiotic to *B. sorokiniana* are commonly found on the surface of wheat seed and other parts of the plant [1001]. This flora appears to be

distinct from the soil flora. On the other hand, the flora on the stubble, largely bacterial, probably arises from the soil [1006]. These bacteria on the soil surface may be destroyed by ultraviolet light or sunshine, as higher root-rot infections of seedlings were obtained where the soil was thus exposed than where soils were kept shaded.

Observation indicated that Thatcher had a shorter subcrown internode than other cultivars of wheat, i.e., the crowns were formed at a greater depth. In experiments, cultivars of *T. aestivum* and of *Hordeum vulgare* differed in the length of the subcrown internode, which appeared to be a heritable character [919]. As already noted, injury caused by high temperature and drought is not uncommon in Sask and under these circumstances infection by *B. sorokiniana* and *Fusarium culmorum* is very common [918]. Severe drought in June when the top 2-3 inches of soil become completely dry interferes with normal development of the crown roots. Under these conditions cultivars with deep crowns apparently have an advantage and may be more able to withstand damage from root-rotting organisms [919]. For additional references see [935, 1002].

Bipolaris tetramera (McKinney) Shoem. (*Helminthosporium t.* McKinney): from crowns of *T. aestivum* 1, 5 Man [93, p. 120].

Botrytis cinerea Pers.: on *T. aestivum* NB NS PEI [1034].

Brachycolus tritici Gill.: the western wheat aphid is associated with the so-called disease, brittle dwarf, on *T. aestivum* Sask 31:11, 32:9, 46:6.

Bullera alba (Hanna) Derx: from rusted straw of *T. aestivum* 1 Man [93, p. 60].

Cephalosporium gramineum Nisikado & Itaka: cephalosporium stripe, strie céphalosporienne: on *T. aestivum* Alta 62:30, Ont NB 58:1, Ont 61:41, [cf. 147].

Cercospora herpotrichioides Fron: eye spot, tache ocellée: on *T. aestivum* Ont 49:1, 54:1, 56:1.

Chaetomium elatum Kze. & Schm.: on moldy heads and straw of *T. aestivum* 1 Sask Man [93, p. 47].

C. globosum Kze.: on glumes of *T. aestivum* 1 Man [93].

Cladosporium herbarum (Pers.) Lk. (*C. graminum* Cda.): leaf spot, tache des feuilles: on *T. aestivum* 1 Alaska [175], Alta 37:5, 39:14, Man [93, p. 116].

C. herbarum and *Alternaria tenuis* (q.v.): black mold, moisissure noire: on *T. aestivum* 1 Alta Sask Man 61:1, NB 60:96.

Claviceps purpurea (Fr.) Tul.: ergot, ergot: on *T. aestivum* BC 30:8, [50, 535], Alta Sask Man NB PEI 24:8, Ont 38:5, Que 28:7, NS 39:4, [cf. 1138]; on *T. aestivum* BC-Man Que-PEI, 5 Sask Man [1034]; on *T. aestivum* 1, 5, especially the latter, Man 25:5, Sask Man [93, p. 45]; on *T. aestivum* 5 Sask 40:1; on *T. aestivum* 6 Man 33:4; on *T. aestivum* BC-Man, 5 Sask, 6 Alta, weedy and roadside grasses are important sources of infection of cult. cereals [172]. Volunteer rye is another source of ergot in crops of wheat, 53:26. The amount of ergot in cereals varies greatly with the season, 53:27.

Cochliobolus sativus (Ito & Kurib.) Drechs. ex Dastur (stat. conid. *Bipolaris sorokiniana* q.v.): By the use of isolates from Sask-NS and Wis, Tinline [1081] confirmed the Japanese work that the perfect state of *B. sorokiniana* is *C. sativus*, as yet unknown in nature. The fungus is hermaphroditic, self-sterile and intergroup fertile. Compatibility groups are widely distributed.

Shoemaker [991] described the spermogonia and ascogonia. Ascospores are multicellular and each cell is multinucleate, but each ascospore is homokaryotic. Hrushovetz [475] showed that the septa are laid down so that hyphal tips and mycelial cells from the conidia are multinucleate initially. Thus a mechanism exists for the perpetuation of hetero-

karyosis. Conjugate divisions occur in the binucleate crozier of *C. sativus* [476]. At meiosis on the third (mitotic) division, eight haploid nuclei are formed. Ascospore delimitation begins and each spore is uninucleate initially. The haploid chromosome number is 7 or 8.

Greaney and Machacek [353] produced mutants of *B. sorokiniana* by ultraviolet radiation, among them a white fertile mutant that did not differ appreciably in pathogenicity from the parent strain. Tinline has reported his results in a series of papers. He recorded the environmental conditions that favor production of mature perithecia in culture. Conidial color and mating type are independently inherited and each is probably governed by a single gene pair [1086]. Conidia of a dark-spored strain were considerably more resistant to high dosages of ultraviolet radiation than those of a white-spored strain. Mutants differed from the parents in many particulars, including pathogenicity to wheat seedlings. Pathogenicity was not a clearly segregating character [1087]. Mutation in a multinucleate propagule appeared to result usually in a heterokaryotic culture as only some isolates were homokaryotic [1082]. Heterokaryons were apparently formed by hyphal fusions and nuclear migration. Repeated isolation of single spores or hyphal tips may reduce variation in strains. Parasexuality is a mechanism of variation in *C. sativus*, and possibly interspecific heterokaryosis and parasexual recombinations occur in the genus. Nondisjunction or heterokaryosis between nonsister ascospores within the ascus may confer variability between some ascospore isolates [1083]. Since filtration enrichment gave outstanding yields of nutritionally exacting mutants, it appears that auxotrophic mutants are imperative in fungi with multinucleate, multicellular propagules, such as *C. sativus* [1084]. Evidently pathogenic strains of *C. sativus* can arise from nonpathogenic ones by mutation, heterokaryosis and parasexual recombinations [1085].

Colletotrichum graminicola (Ces.) G. W. Wils.: anthracnose, anthracnose: on 1 Alta 34:7, Alta Sask Que [1034], Sask 38:6, Man 51:1, Ont 47:1, Ont NS 58:1. According to von Arx [15b, p. 455], the perfect state is *Glomerella tucumanensis* (Speg.) Arx & Müll.

Coprinus urticicola (Berk. & Br.) Buller (*C. brassicae* Pk., *C. phaeosporus* Karst., sensu Lange): on 1 Man [93, p. 108; 411].

Cunninghamella elegans Lendner: on 1 Man [93, p. 32].

Curvularia geniculata (Tracy & Earle) Boed. (*Helminthosporium geniculatum* Tracy & Earle): from crowns and roots of 1, 5 Man, kernels of 1 Man [93, p. 120].

Dictyosporium toruloides (Cda.) Guég. (*Speira t.* Cda.): on stubble of 1 Man [93, p. 127].

Ditylenchus radiculicola (Greef) Filip.: root-gall nematode: on 1 Sask 47:1, [1107].

Drechslera teres (Sacc.) Shoem. (*Helminthosporium t.* Sacc.): from diseased kernels and root of 1 Man [93, p. 120].

D. tritici-repentis (Died.) Shoem. (*Helminthosporium t.-r.* Died.): leaf blotch, tache foliaire: on 1 Alta Ont 57:1, Sask Man Que 39:12, Ont 62:30; on 1 Alta Man Ont, 5 Alta, *Triticum* × *Agropyron* hybrid Ont [993]; on 1 Man, 5 Alta 57:25; on 5 Man Que 37:5; the disease is occasionally epidemic Sask 41:6, Man 39:12.

Epicoccum neglectum Desm.: on heads of 1 Ont 35:7; in soil and on roots of cereals Sask Man [93, p. 117].

E. nigrum Lk. (*E. purpurascens* Ehrenb.): on leaves of 1 Ont 60:44; from roots of 1 Sask [93].

Erysiphe graminis DC. ex Méral: powdery mildew, blanc: on 1 BC 28:10, 35:5, [50, 535], Alta Sask Ont Que PEI 24:8, Sask Man [93, p. 44], Man 42:1, NB 26:3, NS 36:7; on 9 Que 42:1, [cf. 1034, 1138]. Powdery mildew is not an important disease of wheat, but an occasional field, mainly of winter wheat, may be severely infected. Foster and Henry [307] reported that the cleistothecia of the fungus overwintered, ascospores were differentiated by March 15 and were mature by June 15 in Alta. Conidia did not survive beyond October 1. First infection was found on winter wheat on June 15; but see under *Hordeum*.

E. graminis DC. ex Méral f. sp. *tritici* Marchal: collections of *T. spp.* from BC Man Ont yielded a single race [182]. In another study three races distinct from races reported in the US were found: two races were common in collections from BC Alta Man Ont Que. Of 124 wheat cultivars inoculated, several of 1 were resistant, 5 mostly susceptible, 2 very susceptible, whereas 4 and 6 were highly resistant [760].

Fusarium spp.: head blight or scab, fusariose: on 1 BC 42:1, Alta 29:5, Sask-NB PEI 24:8, NS 25:5. Head blight is reported, usually in small amounts, wherever wheat is grown. Its prevalence varies with the season, 20:13, and with the cultivar, 21:7. Mostly between 1937 and 1954, 37:7, 54:2, Gordon made a series of isolations from affected heads. *F. spp.* predominated but occasionally *Bipolaris sorokiniana* (q.v.) was abundant. Gordon [335] reported the following species from heads of 1: *F. acuminatum* Ell. & Ev., Man Ont; *F. avenaceum* (Fr.) Sacc., BC Man-PEI; *F. culmorum* (W.G.Sm.) Sacc., BC Alta Man Ont NS; *F. equiseti* (Cda.) Sacc., Alta-Que; *F. graminearum* Schwabe, Man-PEI; *F. oxysporum* Schlecht., Man; *F. poae* (Pk.) Wr., BC-PEI; *F. sambucinum* Fckl. var. *coeruleum* Wr., *F. sporotrichioides* Sherb., Que. On 3, not 5 as reported: *F. acuminatum*, Man. On 3: *F. graminearum*, Que PEI; *F. poae*, Man Que PEI. On 5: *F. avenaceum*, Man; *F. chlamydosporum* Wr. & Reg., Man; *F. culmorum*, Man Ont; *F. equiseti*, Man; *F. graminearum*, Que; *F. poae*, Man. *F. poae* was also found causing a leaf blight in a field of 5 in Man 38:9, [335].

Fusarium spp.: From seed, Man 1937-42: *F. acuminatum*, *F. equiseti*, *F. poae* predominating, but also *F. avenaceum*, *F. culmorum*, *F. graminearum*, *F. oxysporum*, *F. semitectum* Berk. & Rav. var. *majus* Wr. on 1, 5; *F. moniliforme* Sheld., *F. sambucinum*, *F. s. f. 1* Wr. [*F. s. var. coeruleum*], *F. scirpi* Lamb. & Fautr., *F. s. var. compactum* Wr. on 1; *F. sambucinum* f. 6 Wr. on 5 [332].

From seed of *Triticum*, Canada: *F. acuminatum*, *F. avenaceum*, *F. equiseti* and *F. poae* were common; *F. sporotrichioides*, uncommon; *F. oxysporum* and *F. sambucinum* occurred seldom; *F. moniliforme* and *F. sambucinum* var. *coeruleum* were rare; *F. arthrosporioides* Sherb. and *F. sambucinum* f. 6 were isolated once each [333].

From plants affected by root rot: on 1, *F. acuminatum*, Man; *F. avenaceum*, Sask Man; *F. culmorum*, Sask Mack Man; *F. equiseti*, *F. graminearum*, *F. moniliforme*, Man; *F. oxysporum*, Man NS; *F. o. var. redolens* (Wr.) Gordon, *F. poae*, *F. sambucinum*, *F. solani* (Mart.) App. & Wr., Man; *F. sporotrichioides*, Man Ont. On 5, *F. acuminatum*, *F. avenaceum*, Man; *F. culmorum*, Sask Man; *F. equiseti*, Man; *F. oxysporum*, *F. o. var. redolens*, Sask Man; *F. sambucinum*, *F. solani*, *F. sporotrichioides*, Man [335]. *F. acuminatum*, *F. equiseti* on 1 Alaska [1042]; *F. graminearum* on 1 Alaska [1037].

Machacek and Greaney [634] showed that the use of mechanically injured seed promoted the development of seedling blight and foot rot caused by *F. culmorum* in cereals, thereby retarding growth of the plants and decreasing yields. Similar results were obtained in additional trials; as a result they [635] suggest that the large annual losses in yield caused by root rot of cereals in Western Canada may be substantially reduced by sowing clean, vigorous, sound seed. Deficiencies in phosphate only indirectly affected root rot caused by *F. culmorum* by reducing root development and the total dry weight of the plants [939].

Gelasinospora cerealis Dowding: from crowns of 5 Man [93, p. 48; 266].

Geomyces vulgaris Traaen: from soil Man, roots of 1 Sask [93, p. 119].

Gliocladium roseum (Lk.) Bainier: in soil Man, from roots of 1 Sask [93, p. 119; cf. 1034].

Gloeosporium bolleyi Sprague [*Aureobasidium b.* (Sprague) Arx]: on 1 Man [1034].

Hendersonia crastophila Sacc.: on 1 Alta Sask [1034]; but see *Wojnowicia graminis*.

Heterodera avenae Wr.: oat cyst nematode, nématode de l'avoine: on 1 Ont 38:9.

H. punctata Thorne: grass cyst nematode, nématode des graminées: on 1 Alta Sask 29:6, Sask [1080, p. 707].

Lagena radiculicola Vanterpool & Ledingham [*Lagenocystis r.* (Vanterp. & Ledingham) Copeland]: associated with browning root rot of 1, 5 Sask 29:11, [93, p. 29; 1114, p. 192].

Leptosphaeria avenaria Weber f. sp. *triticea* T. Johnson (stat. pycnid. *Septoria avenae* Frank f. sp. *triticea* T. Johnson): on 1 Sask-Ont, 5 Man [504, p. 262]; on 1 Alta-Ont NB PEI, 5 Man [1034]; ? on glumes of 1 Man, from 1 Sask Man 55:3; prevalent on 1 Man 45:6 et seq. The pathogen caused slight to trace infection on wheat and a trace infection on barley. The fungus is slightly pathogenic to wheat and is found on senescent parts of other cereals and grasses [985].

L. herpotrichioides de Not.: root rot, piétin-verse: on 1 Alta [1034; cf. 999, p. 321].

Metarrhizium sp.: from roots of 1 Sask Man [93, p. 21].

Metasphaeria hyalospora Sacc.: on old straw of ?*T.* sp. Man [93, p. 55].

Monilia geophila Oud.: from roots of 1 Sask [93, p. 121].

M. implicata Gilman & Abbott: from roots of 1 Sask, from soil Man [93].

Mortierella elasson Sideris & Paxton: from roots of 1 Sask, from soil Man [93, p. 32].

Nigrospora sphaerica (Sacc.) Mason: from discolored heads of 1 Man 62:61; in stems of 1 killed by the wheat stem maggot, *Meromyza americana* Fitch, Man [93, p. 122]; from seed of 1 Sask 40:3, [1034].

Olpidium brassicae (Wor.) Dang. (*Astercystis radialis* de Wild., *Olpidiaster r.* (de Wild.) Pascher): root necrosis, nécrose des racelles: on rootlets of 1 Sask 29:11, [93, p. 29; 1034, 1100].

Ophiobolus graminis (Sacc. (*O. ?cariceti* (Berk. & Br.) Sacc.): take-all piétin-échaudage: on 1 BC 36:6, 46:3, [50, 535], Alta 26:2, Sask 24:9, Sask Man [93, p. 55], Man 25:6, 45:2, Ont 44:3, Que 45:2, NS 54:3, [cf. 1034]; on 1, 4, 5, 6, 7 Sask 25:6.

The early records suggest that take-all is most widespread in n.w. Man, n.e. Sask, 25:6, and in n. and central Alta, 39:5. It is usually most prevalent in newly cleared fields in the park belt in Sask [906]. Take-all is distinguished from other diseases by a distinct blackening of the affected basal parts of the plant and by the presence of the characteristic black

mycelium of *O. graminis*. For detailed description see [1003].

Under natural conditions in Alta, *Agropyron* spp. (q.v.) were heavily attacked by *O. graminis*. In summerfallow *A. repens* appeared to aid survival of the pathogen, whereas in infected wheat fields quack grass was associated with severe take-all damage of the crop. In the moister parts of Alta, wheat was severely damaged after 'western rye grass' and moderately so after *Bromus inermis* (q.v.) [815]. In greenhouse experiments, *A. repens* and *B. inermis* encouraged the multiplication of *O. graminis* in both sterilized and unsterilized soil [814]. The fungus was easier to isolate from plant surfaces sterilized with silver nitrate than with mercury chloride. The reverse was true in the isolation of *Bipolaris sorokiniana* (q.v.) and *Fusarium* spp. [247].

Henry [435] found that, at low temperatures, blighting of Marquis wheat seedlings was almost equally severe in sterilized and unsterilized soil, but at high temperatures, most of the seedlings in the sterilized soil were killed whereas those in the unsterilized soil were only slightly attacked. Broadfoot [123] stated that in sterilized inoculated soil Marquis wheat plants were most susceptible in the seedling stage. In sterilized soil, *O. graminis* was more virulent when alone than when *B. sorokiniana*, etc., were also present. When inoculum was added to unsterilized soil, its virulence rapidly declined. In recontaminated steam-sterilized soil, when infested with *O. graminis*, wheat seedlings were usually less severely infected than in similarly infested unsterilized soil. The numbers of microorganisms were increased in the former over the latter soil, especially *Trichoderma viride* Pers., which is antagonistic to *O. graminis* [623].

Certain fungi, bacteria and actinomycetes and filtrates of their broth cultures suppressed or reduced the pathogenicity of *O. graminis* to wheat seedlings in sterilized soil, whereas a few increased its pathogenicity. These few organisms or their filtrates did not suppress the vigor of the plants [937; cf. 932].

The generic position of the fungus has been variously interpreted: *Gaeumannomyces graminis* (Sacc.) Arx & Olivier, 51:2; and *Linospora cariceti* (Berk. & Br.) Petr., 53:3.

Penicillium lilacinum Thom: from roots of 1 Sask, from soil Man [93, p. 123].

P. restrictum Gilman & Abbott: from roots of *T.* sp. Sask, from soil Man [93].

P. thomii Maire: on glumes of 1 etc. Man [93, p. 124].

Pestalotia sp. (*Pestalozzia* sp.): from roots of *T.* sp. Sask, from soil Man [93, p. 131].

Podosporiella verticillata O'Gara (?*Helminthosporium cyclops* Drechs.): on ungerminated kernels of 1 Alta Sask 49:3, [1121]; *Pleosphaeria semeniperda* Brittlebank & Adam, regarded as the perfect state, is unreported in N. America [206].

Polymyxa graminis Ledingham: root-hair necrosis, nécrose des poils absorbants: on roots of 1, 5 grown in soil from three localities in Ont; the morphology and life history of the fungus are described [595, p. 50; cf. 1034].

Pratylenchus minyus Sher & Allen: root-lesion nematode, nématose des racines: along with *Rhizoctonia solani*, the cause of a serious root rot of winter wheat in s.w. Ont 53:4, 54:5. The etiology of the disease has been described by Benedict and Mountain [68].

Pseudomonas atrofaciens (McCull.) Stev. (*Bacterium a.* McCull.): basal glume rot, bactériose des glumes: on 1 Alta-Man 24:9, NS 27:12; on 1, 5 Sask Man [93, p. 28]. Although the disease is reported most

years in the Prairie Provinces, only occasionally has appreciable damage been reported Alta 42:2, Man 40:4. The organism is sometimes isolated from black chaff lesions Man [395]. A specific phage for *P. atrofaciens* was isolated from seed of *I* [1027].

Puccinia graminis Pers. f. sp. *tritici* Erikss. & Henn.: stem rust, rouille de la tige. Stem rust is one of the important diseases of wheat, particularly in s. Man and s.e. Sask. For an excellent account of the disease and the pathogen see Craigie [225], and for a thought-provoking history of rust investigations in Western Canada see Johnson [511]; only a summary is included here.

Stem rust is an epidemic disease that has caused enormous losses in some years. In 1916, the loss in Canada was estimated to be 100,000,000 bu and in the north-central States, 180,000,000 bu [225]. Between 1920 and 1924, stem rust was recorded from BC to PEI and in 1923 it was epidemic in Sask and Man but it was also prevalent in Alta and from Ont eastward, 24:6. In 1935, when a severe epidemic occurred from Alta to Man, rust was also severe in winter wheat in s.w. Ont, 35:1. For 1925-1935, the average loss in yield in Man and Sask was calculated to be about 35,000,000 bu [351]. After 1938, when cultivars resistant to the prevailing races of rust were grown in the rust area, the average wheat production was estimated to have increased by about 41,000,000 bu. However, with the appearance of race 15B of stem rust and new races of leaf rust, wheat yields were again reduced in Western Canada, particularly in 1954, when the loss was about 150,000,000 bu [846]. With the introduction of Selkirk losses were once more largely eliminated.

Light infections only were reported on 5 in Man 29:2, 32:1, 35:1, 38:1, but with the appearance of race 15B, durum wheat was severely injured in Sask and Man, 52:4; indeed it was more heavily infected than common wheat, 54:18. As a result, production of durum wheat almost ceased for a time in the rust area of Man and Sask.

Puccinia graminis is a heteroecious species, 0 I on *Berberis* (q.v.) and II III on cereals and grasses. The common barberry has been largely eradicated in the Prairie Provinces [59, 500], but in E. Canada, where barberries were more widely planted, some severe infestations of escaped bushes are known, particularly in Ont and Que [606, 752]. It should be noted that although the Japanese barberry, *B. thunbergii*, is immune to stem rust in N. America it is susceptible to a form of the rust that attacks *Agropyron* and rye in Japan [19]; a similar form also occurs in India [859].

P. graminis is highly specialized physiologically, a fact first recognized by Eriksson [279]. Of the six physiologic forms recognized by him, *P. graminis* f. sp. *tritici* can attack wheat and barley; f. sp. *secalis*, rye and barley; and f. sp. *avenae*, oats. Of still greater importance to the successful breeding of rust resistant cultivars, Stakman [1052] established that f. sp. *tritici* was highly specialized on various cultivars of *Triticum*.

Annual surveys for the distribution of physiologic races of wheat stem rust have been made in Canada since 1919. The results summarized in [517, 766, 774] show clearly that the race population changes from time to time. From 1919 to about 1930, the prevalent races were: race 17, race group 3-18-36 and race group 17-29. The last group was again important from 1940 to 1948. Race 49 was widely prevalent from 1927 to 1932, race 56 from 1934 to 1949, and race 15B, first found in Canada in 1946, was predominant from 1950 to 1955 [517]. In 1962, race 56 and 15B were still the predomi-

nant races [920]. The distribution of races is similar but not identical in different parts of Canada. A few races are predominant in any one year in the Prairie Provinces, whereas a greater number occur in Eastern Canada [774].

By definition, a physiologic race of rust is a culture identified by its behavior on 12 differential hosts [517]. With the introduction of cultivars resistant to the prevailing races, there appeared biotypes or subraces virtually indistinguishable on the differential hosts but capable of more or less successfully attacking rust-resistant cultivars. For this reason, in recent years, supplementary hosts of important resistant cultivars and lines of Marquis wheat carrying specific genes for resistance have been used in race surveys [920].

The numerous races of wheat stem rust raised the problem of their origin. The role of hybridization was apparent when in 1927 Craigie [221, 222] demonstrated that the pycnia of *P. graminis* and *P. helianthi* (q.v.) were functional and that these rusts were heterothallic, or more correctly, hermaphroditic, self-sterile and intergroup fertile; Newton et al. [794] demonstrated that most races of *P. graminis* f. sp. *tritici* were heterozygous and when selfed on the barberry gave rise to races not previously observed. Races of rust were also successfully crossed.

New races also arise by mutation. Two color mutants were early observed. When these mutant races were crossed, four classes appeared in the F₂: normal reddish brown, yellow, grayish brown and white in the Mendelian ratio 9:3:3:1. In addition, the results of reciprocal crosses revealed evidence of cytoplasmic inheritance [776]. In a white mutant on the barberry, it was assumed that the mutation affected one of the conjugate nuclei [526]. A mutation for pathogenicity was also noted in a uredinial culture [771].

Selfing resulted in many abnormalities, such as loss of ability to produce aecia on the barberry, in some instances to be replaced by uredinia and telia. Selfing, it seems, reveals recessive mutations that have already taken place in the rust [521]. Finally, crossing and selfing studies indicated that pathogenic characters of the rust are segregated and recombined in a Mendelian manner, which might result in the forming of new races from the existing pool of genes for pathogenicity [524]. At that time, however, there was little indication that infection types on any two differential hosts were governed by the same host gene [509; cf. 527]. Moreover, heterokaryosis or somatic recombination of the uredinial stage has been recorded by Nelson et al. [764], Watson [1135], Ellingboe [274] and others. As Johnson [512] has pointed out brilliantly, through his modifications of the host plants of the cereal rusts man is also modifying the rusts.

Infection by stem rust is greatly influenced by temperature. It is less sensitive to temperature than *P. triticea* and appears in Man when temperatures begin to rise. At temperatures above optimum for uredinial development, the higher the temperature the less vigorous is the pustule development [520]. Several cultivars, including McMurchy, immune in the seeding stage at constant low or fluctuating temperatures, were susceptible at a constant high temperature [777]. In a further study, some cultivars behaved as above but others remained moderately resistant or immune to highly resistant at 80 F [525]. The rust reaction of adult plants is specific for certain combinations of host cultivar and rust race [356]. In seedlings of McMurchy the host-parasite relationship is labile; the temperature and light soon after infection determine rust reaction [299]. Mature plant resistance, as distinct from the

reaction to rust in the seedling stage, was important in some early cultivars used in breeding for rust resistance [187, 339]. This reaction is greatly influenced by light intensity, etc.; high temperature may cause its partial or complete breakdown [523].

Again, if the culms of cultivars of wheat, etc., that are resistant in the seedling stage were inoculated with a suspension of urediniospores shortly before the plants were in head, the young rapidly growing parts were very susceptible, the older more mature parts were highly resistant. The same was true of plants possessing mature plant resistance. Under similar conditions, *P. graminis* f. sp. *tritici* attacked oats and rye, and *P. graminis* f. sp. *avenae* and *P. triticina* barley [767].

Young rapidly growing tissues have a higher sugar content than the older tissues irrespective of the reaction of the older tissues to rust, but there appears to be no direct relation between sugar content and reaction to rust [518]. Also, the organic N content of the younger tissues could not be correlated with their susceptibility to rust [519].

Despite the fact that eradication of the barberry in the spring wheat area of the US did not prevent rust epidemics there and in Western Canada, there is no doubt that these bushes caused local epidemics, often of formidable extent, on wheat [1051]. Local epidemics near barberries are common on *Avena* (q.v.) in E. Canada. When collections of aecia made on *Berberis*, chiefly *B. vulgaris*, from the latter area were sown on wheat, barley, oats, rye, *Agrostis alba*, *Poa compressa* and *P. pratensis*, *P. graminis* f. sp. *tritici* was the least frequently isolated of the formae speciales. Most frequent was f. sp. *secalis*, followed by ff. spp. *agrostidis*, *avenae* and *poae* [515]. As a result of crosses between formae speciales, Johnson [505] concluded that natural hybridization between formae speciales of *P. graminis* is of little practical importance because there is considerable sterility and although such hybrids that are found have a broader range of pathogenicity there is an accompanying reduction of pathogenic intensity on any given host. Moreover, prevailing races of wheat stem rust may be losing the ability to infect barberry. Of cultures of 15B investigated at Winnipeg, only a collection made in 1946 gave rise to normal pycnia and aecia, whereas later collections were almost incapable of infecting the barberry [357, 516].

Studies on overwintering of the urediniospores on cereals and grasses indicated that overwintered spores were not a significant source of infection in Western Canada. However, epidemiology studies admirably summarized by Craigie [224] revealed that the initial inoculum each year in the Prairie Provinces consisted largely, if not entirely, of windborne spores originating in more southerly areas. These spores produced infections that increased rust locally and this local inoculum was augmented periodically by additional windborne spores from the south. In 1942, for instance, the growing of resistant cultivars so completely reduced rust inoculum that only traces of rust developed on susceptible cultivars of wheat and barley, 42:3. In 1944, stem rust on susceptible cultivars was somewhat more prevalent, but when collections of stem rust on barley and *Hordeum jubatum* were cultured many proved to be f. sp. *secalis* and not f. sp. *tritici*, which was almost always collected on these hosts before resistant wheat cultivars were grown, 44:3.

Early attempts [511, p. 40] to discover the basis for resistance or susceptibility to wheat stem rust were inconclusive [405, 780]. The presence of phenolic compounds in the sap appear to bear some relation to rust resistance [779], but it was impossible

to relate differences in constitution between cultivars to their rust reaction [9, 10].

Thatcher [1068] observed that race 21 caused an increase of cell permeability of the susceptible cultivars, Mindum and Little Club, whereas in Mindum, resistant to race 36, resistance was associated with a local decrease of permeability. The histological development and permeability changes as a result of infection by rust of 1 and 5 are described [1069].

After the outbreak of race 15B, increased attention was given to a program to discover the physiological and chemical processes associated with resistance and susceptibility to rust. These host-parasite studies have been summarized by Johnson [511] and the subject has been fully reviewed by Shaw [986, 987].

As recorded by Johnson [511], Thompson, at Saskatoon, was the first to attempt the breeding of rust-resistant wheat cultivars in Canada and to study the cytology of crosses between species of *Triticum*. Johnson [511] also reviews the breeding program developed by Goulde and his associates [338, 760, 761, 762] at Winnipeg and by Harrington [416, 417, 418] at Saskatoon. In this period Thatcher at St. Paul, Minn., Renown, Regent and Redman at Winnipeg and Apex at Saskatoon were developed. With the appearance of more virulent races of wheat leaf rust and of race 15B of wheat stem rust, Selkirk, which became the predominant cultivar in 1956, was developed to meet the new menace [840].

In recent studies [511], conducted notably by Knott [557, 558, 559, 561], Green [358, 359] and Campbell [170], there were determined several genes for resistance or hypersensitive reaction to numerous races of stem rust, their uniformity of reaction, and the location of most of the genes in specific chromosomes of the host. Inheritance of both seedling and adult resistance has been reported. Inheritance of resistance in crosses between 1 and *Agropyron elongatum* has also been recorded [990].

In durum wheat, Waddell [1116] studied the inheritance of resistance in crosses involving Iumillo. With the advent of race 15B, other sources of resistance were required. Kenaschuk [551] showed that St. 464, a rust-resistant durum wheat, possessed two genes for resistance and two other genes, one each of which were present in Golden Ball and Camedi. By repeated backcrossing of St. 464 to Stewart, a new cultivar, Stewart 63, was produced as Saskatoon, which possesses excellent resistance to several known races of stem rust including 15B [560]. A parallel program is in progress at Winnipeg.

Rust can also be controlled by chemicals. Bailey and Greaney [42] demonstrated that cereal rusts could be controlled by dusting with sulphur. Greaney [350] found sulphur to be superior to copper and investigated the possibilities of large-scale application. The use of zineb [301] and nickel compounds [300, 302] have been more recently assessed. The possibilities of antibiotics for the control of rust have also been studied [399, 1124, 1126]. The early work with sulphur provided the first factual estimate of the enormous damage caused by rust but, even with the best of the new materials, chemical control is not practical under present conditions.

Puccinia striiformis West. (*P. glumarum* (Schmidt) Erikss. & Henn.): stripe rust, rouille jaune striée: on 1 BC 28:4, 45:3, [535], Alta 26:3, Alta Sask [15, p. 186], Sask 31:4, [93, p. 68]; on 5 Alta 31:4. Stripe rust is occasionally heavy on winter wheat in the interior of BC and in s. Alta. In general, cultivars of 1 were rarely rusted in Alta [938].

The optimum temperature for urediniospore ger-

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mination is 10-12 C and for rust development, 13-16 C. Cultivars susceptible at 10-16 C became extremely resistant at 25 C. For this reason it is unlikely that stripe rust will ever become established in Sask and Man. In the seedling stage, cultivars of 1, 4 and 5 were susceptible to Canadian races of the rust [770].

Puccinia triticea Erikss. (*P. recondita* Rob. ex Desm. and *Dicaeoma clematidis* Arth. p.p., *P. rubigo-vera* Wint. var. *tritici* (Erikss. & Henn.) Carleton): leaf rust, rouille des feuilles. Leaf rust occurs wherever wheat is grown in Canada: on 1 BC 29:3, [535], Alta-PEI 24:7, NB NS PEI [1138]; on 1 Sask-Ont, 7 Man [13]; common on 1 Sask Man, and occasionally on 5, 8 Man [93, p. 71]; heavy on 1, light on 5, very light on 7, 9 Que 42:3, [cf. 15, p. 181].

Leaf rust infection varies greatly from year to year and in epidemic years may reduce yield, first suggested by observation Sask 31:3, 5, and later demonstrated experimentally Man 38:3, 47:3. Heavy infections reduced yield, grade, etc. [848], and percentage of flour, but leaf rust had no other effect on milling and baking quality [849, 850]. Even the yield of resistant cultivars was reduced under heavy leaf rust attack [921].

Leaf rust is the first rust to appear each year in Man when the weather is cool. Uredinial development of this rust is less tolerant to high temperatures than that of *P. graminis* [520]. In an abnormally cool season, heavy infections may not become established early enough to cause appreciable damage Man 42:ix.

Aecia developed on *T. dasycarpum* (q.v.), a native species, in the greenhouse when inoculated with *P. triticea*; outdoors *T. dasycarpum* failed to produce aecia, whereas they developed on *T. glaucum*, an introduced species [145].

Although Brown and Johnson [145] were unable to demonstrate the formation of new races by mixing urediniospores of known races of *P. triticea*, Vakili and Caldwell [1098] state that a greater diversity of races was detected when two uredinial cultures were appropriately mixed, a diversity greater than could be expected if only recombinations of intact nuclei of the parental races were operative as a mechanism of variation.

When cultivars such as Regent and Renown became much more heavily infected than formerly, 45:3, [528], a search for resistance to the new virulent strains began and Selkirk and Pembina [511] were bred from these new sources of resistance.

Pyrenophora trichostoma (Fr.) Fckl.: on stubble of 1 Sask [93, p. 56].

P. tritici-repentis (Died.) Drechsl. (stat. conid. *Drechslera t.-r.* (q.v.)): on 1 Sask 39:12, 41:6, 54:3 [93, p. 56], Ont DAOM 754292; on *Triticum* × *Agropyron* hybrid, Ont DAOM 55158, [993]. Primary infection appears to be caused exclusively by ascospores from overwintering perithecia on the stubble.

Pythium spp., including *P. graminicola* Subram. (*P. arrhenomanes* Drechsl., *P. a.* var. *canadensis* Vanterpool & Truscott [1115, p. 76], *P. aristosporum* Vanterpool [1103, p. 537]), *P. tardicrescens* Vanterpool [1103, p. 534] and *P. volutum* Vanterpool & Truscott [1115, p. 77]: browning root rot, piétin brun: on 1 Alta Sask 32:9, Sask 29:8, Man 33:5; *P. graminicola* on 1 Alta-Ont, and *P. tardicrescens* on 1 Sask [1034].

Losses in diseased fields in e. Sask were estimated to be 10% in 1937, 37:6; by the use of phosphate in adequate amounts, the estimated saving in 1945 was \$3.5 millions, 45:5.

Vanterpool and Truscott [1115] reported that browning root rot is caused by *Pythium* spp., the most important being *P. arrhenomanes* and *P. volu-*

tum. The former was widely distributed over Sask whereas the latter appeared to have a smaller range. The disease was most severe after summerfallow. Injury may result from embryo rot, preemergence killing of the seedlings, postemergence blighting, or retarded development throughout the life of the plant because of impairment of the root system, especially during the seedling stage. The injury may be severe [1115]. Diagrams of the affected plants at different stages of growth have been published [1003].

In a comparative study of *Pythium* spp. parasitic on wheat seedlings, Vanterpool [1103] recognized six species, four of which he recorded in Canada: *P. arrhenomanes*, *P. volutum*, *P. tardicrescens* and *P. aristosporum*. Vanterpool (in litt.) still contends that *P. arrhenomanes* and *P. aristosporum* are distinct from *P. graminicola*, a species originally described from India and recorded by him [1103] in England, but not in Canada. Sprague [1084, p. 31], on the other hand, lumps the three species together. The usual order of frequency in Sask was *P. arrhenomanes*, *P. tardicrescens* and *P. aristosporum*, 40:7, but in 1938 *P. tardicrescens* was more prevalent than *P. arrhenomanes*, 38:8.

Vanterpool [1102] showed that an imbalance of available phosphate and nitrate nitrogen in the soil leads to an unbalanced metabolism of the wheat seedlings, which predisposes them to fungal attack. The application of phosphatic fertilizers improved seedling vigor by increasing the number and rate of growth of roots, which enabled the plant to escape attack. Once the phosphate deficiency was overcome additional amounts of nitrogen were beneficial [1104]. Further work confirmed the earlier findings. Phosphatic fertilizers and farm manure gave adequate control of browning root rot of wheat on infested prairie areas. Phosphorus is probably the chief limiting factor [1105]. The decline of browning root rot in recent years is attributed primarily to increased use of phosphatic fertilizers and the return of most of the crop residue to the soil, 50:3, [1109].

P. arrhenomanes and other *Pythium* spp. when grown on specific media produce thermostable toxins which inhibit germination of wheat and other cereals. *Ophiobolus graminis* (q.v.) and *Fusarium culmorum* also produce substances toxic to wheat [1101].

P. debaryanum Hesse: from roots of 1 Sask 42:5, 55:4, [1034].

P. ultimum Trow: mildly parasitic on 1 Sask 45:5; cf. 41:8.

Rhizoctonia solani Kühn: sharp eyespot, rhizoctone ocellé: on 1 Alaska [1037], Sask 56:3, Man 53:4; with *Pratylenchus minyus* (q.v.) the cause of a root rot of winter wheat in s.w. Ont, 53:4, [68].

Rhizophydium graminis Ledingham: on roots of seedlings of 1 grown in soil from Ottawa, Ont [594, p. 117; cf. 1034].

Sclerophthora macrospora (Sacc.) Thirum., Shaw & Narasimhan: downy mildew, mildiou: on 1 NB 60:96; cf. 61:42.

Sclerotinia borealis Bubák & Vleugel: snow mold, moisissure nivale: on 1 BC 52:4.

S. sclerotiorum (Lib.) de Bary: sclerotia of this fungus found in threshed grain of 1 from fields where *Sonchus arvensis* (q.v.) was growing Sask 42:5.

Septoria nodorum Berk.: glume blotch, tache des glumes: on 1 BC 30:12, [535], Alta-PEI 24:8, [1034], Sask Man [93, p. 139], NS PEI [1138]. Glume blotch is a disease of minor importance but occasionally it may be prevalent, as in Alta, Sask and w. Man in 1923, 23:8. Early reports of *S. nodorum* on leaves

of *I* probably concerned the imperfect state of *Leptosphaeria avenae* f. sp. *triticea* (q.v.).

Septoria tritici Rob. ex Desm.: speckled leaf blotch, tache septorienne: on *I* BC 33:4, 40:8, [535], Alta 31:8, Sask 28:8, Man 24:8, Ont NB 41:8, Que 42:5; [cf. 1034, 1138].

Thielavia terricola (Gilm. & Abbott) Emmons: from culm of *I* Man [93, p. 34].

Tilletia caries (DC.) Tul. (*T. tritici* (Bjerk.) Wint.) and *T. foetida* (Wallr.) Liro (*T. foetens* (Berk. & Curt.) Trel., *T. laevis* Kühn): common bunt, carie: on *I* BC-NB PEI 24:8; on 5 Sask Man 29:3. *T. caries* on *T. sp.* Alaska [175]; on *I* Alaska [1037], BC 30:3, Alta-Man 20:13, Sask Man [93, p. 61], Ont 45:6, Que 51:4, NB [1138], BC-Man, Que NB PEI [292]; on 4 Alta Sask [292]; on 5 Sask Man 29:3, [93, 292]; on 8 Ont [292]. *T. foetida* on *T. sp.* Alaska [175]; on *I* BC Alta NB PEI 30:5, Alaska [1037], BC-Ont NWT NB [292], Sask 20:15, Ont Que 31:6, NB NS [1138]; on 5 Sask Man [292]. Bunt was the most destructive disease of wheat when the west was being opened up to cultivation. Upon the establishment of the experimental farms at Brandon, Man, and at Indian Head, NWT., later Sask, the marked benefits of seed treatment with copper sulphate and then with formaldehyde were demonstrated [511]. By 1900, losses occurred mostly in newly settled districts, where seed treatment had not yet become established practice.

In 1929 in s. and e. Sask *T. foetida* predominated on *I* but only *T. caries* was detected on 5, 29:3. In 1930, bunt was unusually common in Alta; both species were equally prevalent and widely scattered, 30:5. Hanna and Popp [412] also found both species of *Tilletia* widely distributed on *I* in Western Canada, but *T. caries* predominated on 5. In Ont *T. foetida* predominated [204].

Loss in market value of the crop was estimated to be \$400,000 in 1929 [412]. More serious for the individual grower is the loss of crop, which approximates the percentage of heads affected when infection is high Sask Man 29:3, Que 31:6.

Hanna [407] confirmed early experiments [511] that spring-sown wheat may become infected from soil-borne spores, particularly from infected heads lying on the soil surface. Hanna et al. [415] isolated trimethylamine from spores of *T. foetida*; this substance is responsible for the disagreeable odor of bunted wheat. Trimethylamine also occurs in some strains of *T. caries* [406]. Hanna [408] has described the germination of the spores in detail and demonstrated that these fungi are heterothallic. Hanna and Popp [412, 414] reported on the use of copper sulphate, formaldehyde, copper carbonate and several organic mercurials for the control of bunt. After 1945, when many fungicidal preparations were available for seed treatment, Machacek [1] began to report on the effectiveness of a variety of preparations, organic mercurials, hexachlorbenzene and others. In 1950 he headed the cooperative trials on cereal seed dressings carried out at many places in Canada and the US. The results have been reported annually; see [632, 639]. The character of the active ingredients and diluents and the mode of application affect the efficiency of the treatment. Some of the factors are reported in [1123].

T. controversa Kühn (*T. brevifaciens* Fischer): dwarf bunt, carie naine: on *I* BC 48:3, Ont 52:5, [204, 817; cf. 292]. The earliest record of dwarf bunt in Canada was in BC, 31:5, when *T. controversa* was still confused with *T. caries*, 48:ii, and then in Ont in 1947, 53:6. Dwarf bunt may have occurred in Ont much earlier because it is known from Mich as early as 1890 and from Indiana in 1917, 54:6. In Ont dwarf bunt seems mostly confined to counties

bordering on Georgian Bay and Lake Huron. In BC it is mostly found in the Armstrong-Enderby district and the Creston valley. Connors [199] showed that *T. controversa*, first described on *Agropyron* in 1871, was an earlier name for the pathogen. Baylis [61] found that light and rather low temperatures are necessary for germination of the spores. According to Savile [965], the correct spelling of the specific epithet is *controversa*.

Trichothecium roseum (Pers.) Lk.: on leaves of *I* in greenhouse Man [93, p. 128].

Typhula sp.: blight, brûlure: on *I* BC 29:6, 30:5; the report is based on the symptoms observed.

Ustilago reticulata Liro (*U. utriculosa* auct.): grain of *I* was found contaminated with spores of the fungus on *Polygonum scabrum*, a weed in the field, Alta 32:4, [6]; infected plants found in a field of *I* Man 42:6.

U. tritici (Pers.) Rostr.: loose smut, charbon nu: on *I* Alaska [175, 1037], BC-PEI 24:8, Alta-Que NS PEI [292]; on 5 Sask 50:5, Man 45:7, 46:5, Sask Man NB [292]. Loose smut is common, but infection in spring wheat is rarely heavy. However, infection in winter wheat has been sporadically heavy in Ont, 30:7, 31:6, 37:4, 45:7. Because of the susceptibility of the older cultivars, Cornell 595, resistant to loose smut, was introduced, 47:6. In that year the loss from loose smut was estimated to be \$2,895,000. However, Cornell was noticeably susceptible to *Tilletia controversa* (q.v.).

Spring wheat cultivars also differ in their resistance to loose smut. With the introduction of Lee, loose smut increased in Sask and Man, 55:6. It later declined as the acreage of Lee decreased, 56:4. Also, loose smut increased on 5, in part as a result of the susceptibility of Ramsay.

Hanna [409] reported four physiologic forms of *U. tritici*; two were forms collected in Man, one on *I* and the other on 5. The forms in E. Canada appeared to be distinct from those in W. Canada. In wheat, normally a self-pollinated crop, a few healthy plants among infected plants signifies accidental escape from infection.

Popp [856, 858], who studied the infection pattern in the seed, found that only infection of the plumule-bud tissue was correlated with that of the growing plant and the percentage of infection was accurately predicted. In lines that had been artificially inoculated, investigation of a sample required only a few hours. From a comparative study of spore germination of *U. tritici* and *U. nuda*, he concluded that the two fungi were separate species [857].

The standard hot water treatment is still the most reliable method of controlling loose smut. Hanna and Popp [413] tested certain chemicals in water and Tyner [1095] has carried on similar trials. Control was also achieved by soaking the seed in water; see also *Hordeum*.

Wojnowicia graminis (McAlp.) Sacc. & D.Sacc.: basal rot, piétin tardif: on *I* Alta [124], Sask 24:9, [93, p. 141]; common in Alta on basal parts of winter and spring wheat often in association with *Ophiobolus graminis*, but attempts to infect wheat were unsuccessful [124]. According to Sprague [1034, p. 174] *W. graminis* is not distinct from *Hendersonia crastophila* Sacc.

Xanthomonas translucens (Jones, Johnson & Reddy) Dowson or *X. t.* f. sp. *undulosa* (Sm., Jones & Reddy) Hagborg: bacterial black chaff, glume noire: on *I* Alta Sask NB 29:6, Sask Man [93, p. 28], Man 24:9, Ont 43:7, Que 34:4; on 5 Sask 45:7, Man 55:7. Isolated in 1933 from collections of *I* in Man and Ont, 34:4. In severe infections the

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leaves and neck may be infected, 39:4. Sometimes infection may be heavy, causing damage to the crop Sask Man 39:4, 42:7. Cultivars differ widely in their susceptibility Man 48:4, 57:4; these differences have been noted in the field Alta 51:5, 52:7.

Xanthomonas translucens f. sp. *cerealis* Hagborg: on 1 Man 40:4; sometimes equally or more prevalent than f. sp. *undulosa*, Man 43:7, 44:7. Both ff. spp. occur naturally on *Triticum* spp. [396].

Agropyron mosaic virus: agropyron mosaic, mosaïque de l'agropyron: on 1 and *Triticum* × *Agropyron* hybrid Ont [1025]; on 1 Ont [1026]. Common in s. Ont and Que and known from Sask and PEI. Eriophyid mites, particularly *Aceria tulipae*, were abundant on wheat, but attempts to transmit the virus were unsuccessful. The etiology of the disease is described in detail [cf. 1020].

Barley yellow dwarf virus: barley yellow dwarf, nanisme jaune de l'orge: on 1 Alta Sask Man 62:32, Ont 63:69, [1030]; on 5 Sask 63:69, Man 62:32. Although the symptoms on wheat may be mild, infection by BYDV may substantially reduce yield [1031].

Wheat spot mosaic virus: wheat spot mosaic: Slykhuis [1019] described this disease, which is readily transmitted by the mite *Aceria tulipae*, but could not be transmitted manually. Mixed infections with wheat streak mosaic virus are common in Alta. A mild form of this virus occurs in Ont [1020].

Wheat streak mosaic virus: wheat streak mosaic, mosaïque-bigarrure: on 1 s. Alta 52:7, although first observed in 1948, 48:5. Slykhuis [1017] described the disease and discovered the vector, *Aceria tulipae* (Keifer) [1018]. The disease is most prevalent when winter wheat is sown before nearby infected winter or spring wheat crops were mature [1017]. Conditions favorable for an epidemic occurred in the fall of 1954 in Alta, 54:7, and again in 1963, [26].

Wheat striate mosaic virus: wheat striate mosaic: A trace to 1% of the plants of 1 and 5 were affected in s.e. Sask and s. Man in 1961 [1020]. The vector in N. America is the leafhopper *Endria inimica* (Say). A trace was reported in one field of spring wheat in s. Alta, 62:32. Ramsay and Selkirk are severely affected by the virus. Cultivars of wheat differ widely in their susceptibility and some of the currently important cultivars are very susceptible [1021].

Blotchy chlorosis, chlorose: on 1, 5 Sask; the symptoms suggest a virus disease but transmission experiments failed [1020].

Chemical injury: from herbicide, Sask 30:28, 50:7, 52:8; from insecticide, Alta 54:7.

Chlorotic banding, étranglement chlorotique: caused by high or freezing temperatures at the soil line; on 1 Sask 48:5, [1108, 1112].

Nitrogen deficiency, carence d'azote: suspected as the cause of yellowing and poor growth of 1 Sask 52:8.

Soil-borne mosaic: first observed on winter wheat in Ont in 1957, 60:43, 63:69, [1020]. The disease is transmitted by infected soil, but its virus nature is unproven [1020].

Many minor disorders have been described in the Survey reports but they will not be listed.

Tritonia Ker

IRIDACEAE

Plants of s. Africa; a few grown for their showy bloom.

1. *T. hyalina* Ker.

Tomato spotted wilt virus: spotted wilt, tache de bronze: on 1 Que 43:117.

Tropaeolum L.

TROPAELACEAE

Annual or perennial herbs of Mexico to Chile; some cult. in flower gardens.

1. *T. majus* L., garden nasturium, capucine; S. America.
2. *T. polyphyllum* Cav.; Chile and Argentina.

Albugo cruciferarum S.F.Gray (*Cystopus candidus* (Pers.) Lév.): white mold, albugine: on 1 Sask 34:88, [93, p. 29].

Botrytis cinerea Pers.: on 1 Alaska [175].

Ditylenchus dipsaci (Kühn) Filipjev: stem nematode, nématose des tiges: on 2 imported from Holland, 39:108.

Pseudomonas aptata (Brown & Jamieson) F.L.Stev.: on 1 Alta 32:92.

Aster yellows virus: aster yellows, jaunisse de l'aster: on 1 NS 55:124, 60:99.

Tsuga (Endl.) Carr.

PINACEAE

Evergreen coniferous trees of N. America and Asia.

1. *T. canadensis* (L.) Carr., eastern hemlock, pruche; in Canada from PEI and NS to Que and Ont. The wood is used for timbers and general construction, boxes and crates, railway ties and pulp.
2. *T. heterophylla* (Raf.) Sarg., western hemlock, pruche; Alaska to BC, Idaho and Calif. The wood is a valuable source of pulpwood and is used extensively for lumber and general construction.
3. *T. mertensiana* (Bong.) Carr., mountain hemlock, pruche de montagne; Alaska to BC, Mont, Idaho and Calif. Because of its relative inaccessibility, the tree is of little economic importance in Canada.

Aleurodiscus amorphus (Pers. ex Fr.) Schroet.: on 3 BC [599].

A. farlowii Burt: on 1 Ont Que [599].

A. minnsiae Jackson (stat. sclerot. *Minnsia carnae* Ell. & Ev. inedit.): on 1 Ont type, Que, 2 BC; its history, distribution and relation to other species are discussed [496, p. 67]. Jackson's observation that the sclerotium cups in this species act as splash cups was confirmed [132]; see *Abies*.

A. penicillatus Burt: on 1 Ont [599]; on slash of 2 BC [304, 599, 1198].

A. spinigei Rogers & Lemke: on 2 BC [599, p. 265].

A. weirii Burt: on *T. sp.* Alaska [175]; on 2 BC [599, 1198].

Arceuthobium campylopodum Engelm. f. *tsugensis* (Rosendahl) Gill.: dwarf mistletoe, faux-gui: on 2 BC 41:86, F51:150, F54:131, [570].

Armillaria mellea (Vahl ex Fr.) Kummer: root rot, pourridié-agaric: on 1 Ont F54:76, NS 30:79, [1138]; from or on 2 BC [149, 303, 304, 1198].

Asterodon ferruginosus Pat.: on 2 BC [1198].

- Atropellis treleasii* (Sacc.) Zeller & Goodding: on 2 BC F54:133.
- Boletellus mirabilis* (Murr.) Singer: on 2 BC [1198].
- Caliciopsis* sp.: associated with branch cankers on 2 BC F54:133, [1198].
- C. orientalis* Funk: on 1 Ont [318, p. 507].
- C. pseudotsugae* Fitzp.: on 2 BC F62:121, [318].
- Cantharellus aurantiacus* Wulf. ex Fr.: recorded on 2 BC [1198].
- Cephalosporium* sp.: associated with cankers on suppressed 2 BC [257]; low bark moisture during dormancy was shown to favor development of cankers [84].
- Ceratiomyxa fruticulosa* (Muell.) Macbr.: reported on 1 NS [1138].
- Clithris crispa* (Pers.) Rehm: on 2 BC [1198].
- Coniophora puteana* (Schum. ex Fr.) Karst.: brown cubical rot, carie brune cubique: on 1 NB [1198]; from 2 BC [303].
- Conoplea juniperi* Hughes var. *robusta* Hughes: on 2 BC F63:125.
- Corirolellus heteromorphus* (Fr.) Bond. & Sing. (*Trametes heteromorpha* (Fr.) Bres.: on *T. sp.*, 2, 3 Alaska [175]; on 1 NS [1138]; on or from 2 BC [791, 1198], Alaska [555].
- C. sepium* (Berk.) Murr. (*Trametes s. Berk.*): on 2 Alaska [1038].
- C. serialis* (Fr.) Murr. (*Trametes s. Fr.*): on *T. sp.*, 2, 3 Alaska [175]; on 2 BC [304, 1198].
- C. variiformis* (Pk.) Sarkar (*Trametes v. Pk.*): on or from 2 BC [791], Alaska [175].
- Corticium bicolor* Pk.: on 2 BC [1198].
- C. delicatissimum* Jackson: on rotting wood of 1 Ont type [498, p. 722].
- C. furfuraceum* Bres.: on 2 BC [1198].
- C. galactinum* (Fr.) Burt: white stringy rot, carie blanche filandreuse: from 1 NB NS F53:22; on or from 2 BC [303, 1198]; see *Abies*.
- C. hydnans* (Schw.) Burt: on 2 BC [1198].
- C. inopinatum* Jackson: on wood and bark of 1 Ont type [498, p. 718].
- C. rallum* Jackson: on bark of 1 Ont type [498, p. 723]; see *Acer*.
- Cryptosporiopsis* sp.: on 2 BC; appeared to be the conical state of *Pezicula livida* (Berk. & Br.) Rehm, F57:86.
- Dacrymyces palmatus* (Schw.) Bres.: on 1 NS [1138].
- Dacryomitra nuda* (Berk. & Br.) Pat.: on 2 BC [1198].
- Dasyscyphus agassizii* (Berk. & Curt.) Sacc.: on 2 BC [1198].
- Delphinella strobiligena* (Desm.) Sacc. ex Clem. & Shear: on 1 Ont F62:69.
- Dermea balsamea* (Pk.) Seav. (stat. conid. *Gelatinosporium abietinum*, q.v.): on 1 Ont Que NS [370], NS [1138].
- Dimerosporium tsugae* Dearn. [*Dimeriella balsamicola* (Pk.) Petr.]: needle cast, rouge: on *T. sp.*, 2 Alaska [175]; on 2 BC F52:152, [50, 1198; cf. 284].
- "*Echinodontium tinctorium*" Ell. & Ev. (*Fomes tinctorius* Ell. & Ev.): brown stringy rot, carie brune filandreuse: from 2 BC F51:149, [791, 1198]; on *T. sp.*, 2, 3 Alaska [175]; an important cause of decay of 2 BC F52:145, 146, [303].
- Fabrella tsugae* (Farl.) Kirschst. (*Didymascella t.* (Farl.) Maire): on *T. sp.* Alaska [175]; on 1 Ont F63:69.
- F. tsugae* ssp. *grandispora* Ziller: on 2 BC type [568, p. 28].
- F. tsugae* ssp. *tsugae* (Keithia t. Farl.): on 1 Ont 34: 111.
- Femsjonia radiculata* (Fr.) Martin: on 2 BC [1198].
- Flammula alnicola* (Fr.) Kummer (*F. connisans* auct. Am.): yellow checked rot, carie jaune craquelée: from 2 BC [303, 1198].
- Fomes annosus* (Fr.) Cke.: root rot, maladie du rond: from 2 BC 41:86, [149, 303, 304, 791, 1198], Alaska [175, 555, 1038]; common in both BC and Alaska.
- F. fomentarius* (L. ex Fr.) Kickx: from 1 Ont F55:62.
- F. nigrolimitatus* (Rom.) Egel.: white pocket rot, carie blanche alvéolaire: on 2 Alaska [175], BC [304, 1198].
- F. officinalis* (Vill. ex Fr.) Neuman (*F. laricis* Jacq. ex Murr.): brown cubical rot, carie brune cubique: from 2 BC [304].
- F. pini* (Brot. ex Fr.) Karst.: red ring rot, carie blanche alvéolaire: on and from 1 Ont F53:79, F54:71; from 2 BC F51:149, [1198], an important cause of decay [149, 303, 304]; on 2 and especially 3 Alaska [555].
- F. pinicola* (Sw. ex Fr.) Cke.: brown cubical rot, carie brune cubique: on 1 Ont, 2, 3 BC [740]; on or from 2 BC F53:154, [149, 304, 791, 1198], an important cause of decay [303]; on living 2 and dead 3 Alaska [555]; on 2 Alaska [175, 1038]; on 3 Alaska [175].
- F. robustus* Karst. (*F. hartigii* (Allesch. & Schnabl) Sacc. & Trav.): white spongy rot, carie blanche spongieuse: on or from 2 BC [149, 1198]; on 2, 3 Alaska [555].
- F. roseus* (Alb. & Schw. ex Fr.) Karst.: brown cubical rot, carie brune cubique: on 2 BC [1198].
- F. subroseus* (Weir) Overh.: brown cubical rot, carie brune cubique: on logs of 1 NS [1138].
- Fusarium avenaceum* (Fr.) Sacc.: from discolored wood of 1 BC [335].
- Ganoderma applanatum* (Pers. ex Wallr.) Pat. (*Fomes applanatus* (Pers. ex Wallr.) Gill.): white mottled rot, carie blanche madrée: on or from 2 BC [149, 303, 304, 1198]; occasionally on living trees of 2 Alaska [175, 555].
- G. lucidum* (Leyss. ex Fr.) Karst.: on 1 NB NS 50:118.
- G. oregonense* Murr.: on or from 2 BC [149, 304, 791, 1198], Alaska [175].
- G. tsugae* Murr. (*Polyporus t.* (Murr.) Overh.): from 1 Ont, 2 BC [791]; on 1 NB NS F53:24, [1138].
- Gelatinosporium abietinum* Pk.: on 1 NS [1138].
- Grandinia granulosa* Fr.: on 2 BC [1198].
- Guepiniopsis chrysocomus* (Bull. ex Tul.) Brasf.: on 2 BC [1198].
- Hercium abietis* (Weir ex Hubert) K. Harrison (*Hydnum abietis* Weir ex Hubert): yellow pitted rot, carie jaune alvéolaire: on or from 2 Alaska [175], BC F52:152, [149, 303, 304, 1198]; on 3 BC F56:91, [1198].
- Herpotrichia nigra* Hartig: brown felt mold, feutrage brun: on 2 BC [50, 1199]; on 3 Alaska [175].
- Hymenochaete badioferruginea* (Mont.) Lév. and *H. fuliginosa* (Pers.) Bres.: on 2 BC [1198].
- H. tabacina* (Sow. ex Fr.) Lév.: on 2 BC [304, 1198].
- Hypomyces aurantius* (Pers.) Tul.: on *Fomes pinicola* and *Polyporus resinousus* on 2 BC F52:152.
- Hypoxylon cerebrinum* (Fée) Cke. (*H. asperum* Masee): on 2 BC [50]; for specimen see DAOM 34160.
- Kuehneromyces vernalis* (Pk.) Sing. & Sm. (*Naucoria lignicola* (Pk.) Sacc., *N. v.* (Pk.) Sacc.): on 2 BC [1198].
- Lenzites saepiaria* (Wulf. ex Fr.) Fr.: brown cubical

Tsuga

- rot, carie brune cubique: from 1 Ont F55:62; on 2 Alaska [555], BC [304, 1198].
- Lenzites trabea* Pers. ex Fr.: brown cubical rot, carie brune cubique: from 1 Ont [791]; on 1 Ont F63:70.
- Lophodermium* sp.: on 2 Alaska [175], BC [1198].
- Marasmius ?filipes* Pk. and *M. perforans* Fr.: on *T. sp.* Alaska [175].
- Margarita metallica* (Berk. & Br.) Lister: on *T. sp.* NS [1138].
- Melampsora abietis-canadensis* C. A. Ludwig ex Arth.: rust, rouille: 0 I on needles, stems and cones of 1 Ont F53:86, Que NS [15, p. 53; cf. 1138].
- M. epitea* Thüm. f. sp. *tsugae* Ziller (*Caecoma dubium* C. A. Ludwig): needle rust, rouille des aiguilles: 0 I on 2 BC shown to cause infection on *Salix* F52:152, [1202, p. 115; 1198].
- M. farlowii* (Arth.) Davis: 0 III on 1 NS [15, p. 53; 1138].
- Merulius fugax* Fr.: on 2 BC [1198].
- M. himantoides* Fr.: brown cubical rot, carie brune cubique: from 2 BC [303]; see *Abies*.
- M. tremellosus* Schrad.: on 2 BC F54:133, [1198].
- Microthyrium harrimanii* Sacc.: on 2 Alaska [175].
- Mollisia pinastri* (Cke. & Pk.) Sacc.: on needles of 2 F58:102, [1203].
- Mycena epipterygia* (Fr.) Quél. and *M. epipterygia* var. *lignicola* A. H. Smith: on logs of 1 NS [1138].
- Myxosporium abietinum* Rostr.: on 2 BC [1198].
- Naematoloma fasciculare* (Huds. ex Fr.) Karst.: recorded on *T. sp.* BC [1198].
- Odontia arguta* (Fr.) Quél.: on 2 BC [1198]; see *Salix*.
- O. bicolor* (Alb. & Schw. ex Fr.) Quél.: white stringy rot, carie blanche filandreuse: from 1 NB NS F53:22; on or from 2 BC [303, 792, 1198].
- O. lactea* Karst.: on 2 BC [1198].
- O. sudans* (Fr.) Bres.: on 2 BC [1198]; see *Picea*.
- Panus stypticus* (Bull. ex Fr.) Fr.: on *T. sp.* BC [1198].
- Paxillus atrotomentosus* (Batsch ex Fr.) Fr.: recorded on 2 BC [1198].
- P. panuoides* Fr.: on 2 BC F62:122.
- Pellicularia vaga* (Berk. & Curt.) Rogers: on 2 BC [1198]; see *Abies*.
- Peniophora aspera* (Pers.) Sacc.: on 2 BC [1198]; see *Abies*.
- P. cinerea* (Fr.) Cke.: from 2 BC F58:102, [1203].
- P. crassa* Burt ex Pk.: on 2 Alaska [175].
- P. crenea* (Bres.) Sacc. & Syd.: recorded on 2 BC [1198].
- P. dryina* (Berk. & Curt.) Rogers & Jacks.: on 2 BC [1198].
- P. gracillima* Ell. & Ev.: on 2 BC [1198]; see *Abies*.
- P. luna* Rom.: on 2 BC [1198].
- P. perexigua* Jackson: on bark of 1 Ont [493, p. 132].
- P. probata* Jackson: on wood of 1 Ont [493, p. 136].
- P. pulverulenta* (Litsch.) Jacks. [*Xenasma pulverulentum* (Litsch.) Donk]: on bark of 1 Ont [497].
- P. pusilla* Jackson: on bark of 1 Ont Que [493, p. 137].
- P. sambuci* (Pers.) Burt: on 1 NS [1138]; see *Acer*.
- P. sanguinea* (Fr.) Höhn. & Litsch.: on 2 BC [1198].
- P. separans* Burt: on 2 BC [793, 1198].
- Phialocephala fusca* W.B.Kendr.: from rot of 2 BC [554].
- Phlebia albida* Post ex Fr. and *P. radiata* Fr.: on 2 BC [1198].
- Pholiota aurivella* (Batsch ex Fr.) Kummer (*P. adiposa* auct. Am.): brown mottled rot, carie brune madrée: from 2 BC [303, 304, 1198], Alaska [555].
- P. malicola* (Kauffm.) A. H. Smith: recorded on 2 BC [1198].
- Platyglea fusco-atra* Jacks. & G.W.Martin: on decayed wood of 1 Ont [673, p. 691].
- Pleurotus petaloides* (Fr.) Quél.: on 2 BC [304, 1198].
- P. serotinus* (Schrad. ex Fr.) Kummer: on *T. sp.* BC [1198].
- Polyporus abietinus* Dicks. ex Fr.: white sap rot, carie blanche de l'aubier: on 1 Ont F55:62, NB NS [1138]; on or from 2 BC [149, 304, 1198]; Alaska [175, 555].
- P. alboluteus* Ell. & Ev. and *P. amorphus* Fr.: on 2 BC [1198].
- P. anceps* Pk.: red ring rot, carie rouge rayonnante: on 2 BC [1203].
- P. balsameus* Pk.: brown cubical rot, carie brune cubique: on or from 2 BC [791, 1198].
- P. benzoinus* Wahl. ex Fr.: on 1 NB NS [1138]; although distinguished by Wehmeyer from *P. resinosus*, q.v., most students believe it not to be distinct from the latter.
- P. borealis* Fr.: white mottled rot, carie blanche madrée: on 1 NS [1138].
- P. caesius* Schrad. ex Fr.: on 2 BC [1198].
- P. dryadeus* Pers. ex Fr.: on 2 BC [304, 1198].
- P. elegans* Bull. ex Fr.: on 1 NS [1138]; on logs of 2 Alaska [555].
- P. fibrillosus* Karst.: brown cubical rot, carie brune cubique: on or from 2 BC [304, 791, 1198], Alaska [555].
- P. fragilis* Fr.: on 2 BC [1198].
- P. guttulatus* Pk.: from 1 Que [791]; on 2 BC [304, 1198].
- P. montanus* (Quél.) Ferry: white spongy rot, carie blanche spongieuse: on or from 2 BC [304, 791].
- P. picipes* Fr.: on 2 BC [304, 1198], Alaska [175].
- P. resinosus* Schrad. ex Fr.: brown cubical rot, carie brune cubique: on 3 BC [304, 1198]; on dead 2, 3 Alaska [555]; on 3 Alaska [175].
- P. schweinitzii* Fr.: brown cubical rot, carie brune cubique: on or from 2 BC [303, 304, 1198], Alaska [555].
- P. sulphureus* Bull. ex Fr.: brown cubical rot, carie brune cubique: on 1 NS 30:118; on or from 2 BC [149, 303, 304, 1198], Alaska [175, 555]; an important pathogen in butt rot of 2.
- P. tephroleucus* Fr.: on 2 BC [1198].
- P. tomentosus* Fr.: red butt rot, carie rouge alvéolaire du pied: on or from 2 BC [304, 1198].
- P. tomentosus* var. *circinatus* (Fr.) Sartory & Maire: red butt rot, carie rouge alvéolaire du pied: on 1 Canada 33:82; from 2 BC [304, 1198].
- P. undosus* Pk.: on or from 2 BC F53:156, [1198].
- P. versicolor* L. ex Fr.: on 1 NS [1138]; on 2 BC [1198].
- P. volvatus* Pk.: on or from 2 BC [303, 304, 1198].
- Poria albipellucida* Baxt.: from and recorded on 2 BC [1198].
- P. albobrunnea* (Rom.) Baxt.: on 2 Alaska [175].
- P. candidissima* (Schw.) Cke.: on 2 BC [1199].
- P. carbonica* Overh.: on 2 BC [790, p. 232; 813, p. 205].
- P. cocos* (Schw.) Wolf: white spongy rot, carie blanche spongieuse: from 2 BC [303, 1203].
- P. crassa* (Karst.) Sacc.: on old logs of 3 Alaska [175, 555].
- P. ferrea* (Pers.) Bourd. & Galz.: on 2 BC [304, 1198].
- P. ferrugineofusca* Karst.: on 2 BC [1198], Alaska [175].
- P. lenis* (Karst.) Sacc.: on 2 BC [1198].

Poria monticola Murr. (*P. microspora* Overh.): brown cubical rot, carie brune cubique: from 2 BC [304, 790, 791]; recorded on 2 BC [1198].

P. myceliosa Pk.: on 2 BC [1198].

P. nigrescens Bres.: white spongy rot, carie blanche spongieuse: from and recorded on 2 BC [149, 304, 1198].

P. sanguinolenta (Alb. & Schw.) Cke. (*P. decolorans* (Schw.) Cke.): white spongy rot, carie blanche spongieuse: on 2 BC [304].

P. sericeomollis (Rom.) Egel. (*P. asiatica* (Pilát) Overh.): brown cubical rot, carie brune cubique: from 2 BC [149, 303, 1198]; see *Abies*.

P. sitchensis Baxt.: on 2 Alaska [175].

P. subacida (Pk.) Sacc.: white stringy rot, carie blanche filandreuse: from 1 NB NS F53:22; on or from 2 BC [303, 304, 791, 1198]; on 2, 3 Alaska [175, 555].

P. subincarnata (Pk.) Murr.: on 2 BC [304, 1198].

P. tsugina (Murr.) Sacc. & Trott. (*Fomes robustus* Karst. var. *tsuginus* (Murr.) Overh.): from 1 Que, 2 BC [791]; on or from 2 BC [303, 304, 1198]; on 1 Que 38:94; on 2, 3 Alaska [175]. Lowe and Gilbertson [618] reduce this species to synonymy under *P. punctata* (Fr.) Karst.

P. undata (Pers.) Bres.: on 2 BC [304].

P. versipora (Pers.) Rom.: on 2 BC [304]; also in [1198] but the record was later deleted [1199].

P. weirii Murr.: yellow ring rot, carie jaune annelée: from or on 2 BC 41:86, F52:145, [149, 791, 1198].

P. xantha (Fr.) Cke.: brown cubical rot, carie brune cubique: from 2 BC [791].

P. zonata Bres.: on roots of 2 BC [326].

Pseudohydnum gelatinosum (Fr.) Karst.: on 2 BC [1198].

Pucciniastrum vaccinii (Wint.) Jørstad (*P. myrtilli* (Schum.) Arth., *Thekopsora vacciniarum* Karst.): needle rust, rouille des aiguilles: 0 I on 1 Ont F63:71, NS 33:62, 124, 59:85, F63:37, [15, p. 18; 1138].

Radulum orbiculare Fr.: on 2 BC [1198].

Retinocyclus olivaceus Fckl.: on 2 BC F61:125.

Rhizina undulata Fr. ex Fr. (*R. inflata* Schaeff. ex Karst.): on 2 BC [1198].

Rhizothyrium abietis Naum.: on 1 Ont [240a].

Scytinostroma ochroleucum (Bres. & Torr.) Donk (*Corticium abeuns* Burt): on 2 BC [1198, 1199].

Sporonema strobilinum Desm.: on 3 Alaska [175].

Sporoschisma sp.: associated with stem canker of 2 BC F57:86.

Stereum abietinum (Pers. ex Fr.) Fr.: brown cubical rot, carie brune cubique: from 2 BC [303, 304, 791, 1198]; on 2 Alaska [175].

S. bicolor (Pers. ex Fr.) Fr.: recorded on 2 BC [1198]; see *Betula*.

S. chailletii (Pers. ex Fr.) Fr.: white stringy rot, carie blanche filandreuse: from 1 NB NS F53:22; on or from 2 BC [303, 304, 1198]; see *Abies*.

S. ostrea Blume & Nees ex Fr. and *S. rugisporum* (Ell. & Ev.) Burt: on 2 BC [1198].

S. sanguinolentum (Alb. & Schw. ex Fr.) Fr.: white stringy rot, carie blanche filandreuse: on or from 2 BC [303, 1198], Alaska [555].

S. sulcatum Burt in Pk.: on 2 BC [1198].

Thelephora terrestris Ehrh. ex Fr.: on 2 BC [1198].

Tomentella fusca (Fr.) Schroet.: on 2 BC [1198].

Trametes alaskana Baxt.: on 2, 3 Alaska [175].

T. tenuis Karst.: on 2 BC [1198].

Trechispora brinkmanni (Bres.) Rogers & Jacks.: white stringy rot, carie blanche filandreuse: on or from 2 BC [303, 304, 1198]; see *Abies*.

T. raduloides (Karst.) Rogers: red heart rot, carie rouge du cœur: from 2 BC [303, 1198]; a conidium-bearing species [674]; see *Abies*.

Trichocladium canadense Hughes: from 2 BC [483].

Truncocolumella rubra Zeller: on soil and duff under 2 BC [1198].

Tubifera ferruginosa (Batsch) Gmel.: on 1 NS [1138].

Tympanis tsugae Groves: on 1 Ont Que [372, p. 596].

Uraecium holwayi (Arth.) Arth. (*Uredo h.* Arth.): needle rust, rouille des aiguilles: on 2 BC 44:102, [1198], Alaska [175]; on 2 Alaska BC, 3 BC [15, p. 391]; may cause severe defoliation of 2 Alaska [555].

Valsa abietis Fr.: canker, chancre cytosporéen: on 2 BC F57:86.

Vararia granulosa (Pers. ex Fr.) Laurila: on 2 BC [304, 1198].

V. pallescens (Schw.) Rogers & Jacks.: on 2 BC [1198].

Verticillium sp.: from 2 BC [1198].

Xeromphalina campanella (Batsch ex Fr.) Kühner & Maire (*Omphalia c.* (Batsch ex Fr.) Qué.) white stringy rot, carie blanche filandreuse: from and recorded on 2 BC [303, 304, 1198].

Tulipa L.

LILIACEAE

Low spring blooming plants of the Mediterranean region and across Asia to Japan; cult. for their flowers.

1. *T. fosteriana* Hoog; central Asia.
2. *T. gesneriana* L., tulip, tulipe; Asia.

Armillaria mellea (Vahl. ex Fr.) Kummer: dry rot, pourridié-agaric: on 2 BC 40:98, [535].

Botrytis cinerea Fr.: gray mold, moisissure grise: on *T.* sp. Alaska [175].

B. tulipae (Lib.) Lind: fire, feu: on 1 Ont 52:120, NB 60:69, PEI 57:129; on 2 BC [535], BC Ont 24:56, Alta 41:99, Sask 28:89, Man 33:74, [93, p. 113], Que 51:119, Que NS PEI 25:76, NB 60:69, NB NS PEI [1138]. The disease is destructive in BC, the Maritime Provinces, Ont and Que, especially in years of high spring rainfall. In the commercial bulb-growing areas of BC, it was soon found that primary infection must not exceed 0.1% if the disease was to be kept in check, 35:73, 39:108, 44:117. This figure became the maximum percentage allowed in the field for bulbs to qualify for Foundation grade.

Cylindrocarpum radiculicola Wr.: root rot, chancre des racines: the predominant fungus isolated from diseased 2 Man 29:109.

Fusarium spp.: basal rot, pourridié fusarien: *F. oxysporum* Schlecht. (*F. bulbigenum* Cke. & Mass.) and *F. solani* (Mart.) App. & Wr. were isolated from infected bulbs of 2 Man 38:109, [335]; *F. oxysporum* from infected bulbs BC 58:121; *F.* sp. destroyed plants Ont 33:74.

Fusarium spp.: bulb rot, pourriture fusarienne du bulbe: from 2 BC 27:100; *F. acuminatum* Ell. & Ev. and *F. oxysporum* var. *redolens* (Wr.) Gordon from 2 Man 39:109, [335].

Tulipa

Fusarium spp.: *F. acuminatum* and *F. o.* var. *redolens* from decayed leaf tips Man 39:109, [335]; *F. acuminatum* and *F. poae* (Pk.) Wr. from decayed roots along with *Cylindrocarpon radicicola* (q.v.), Man, and *F. oxysporum* from blind bulbs BC [335].

Penicillium spp.: bulb rot, pourriture du bulbe: on 1 PEI 54:137; on 2 BC 32:97, 41:99, Alta 55:127, Ont 36:85, PEI 33:74.

Phytophthora cactorum (Leb. & Cohn) Schroet.: blossom blight, mildiou: on 2 Ont 38:110.

Pratylenchus penetrans (Cobb) Filip. & Stekh.: root-lesion nematode, nématose des racines: on 2 BC 53:119, 54:138, [535].

Pythium ultimum Trow: root and bulb rot, pourridié pythien: on 2 BC 47:115, [535], Ont 54:138.

Rhizoctonia solani Kühn.: rhizoctonia, rhizoctonie: on 2 BC 52:120, 54:138, [535].

Sclerotinia sativa Drayton & Groves: sclerotinia rot, pourriture sclérotique: on 2 Que 38:110, 39:109, 58:121, [266], what may have been *S. minor* Jagger affected 2, BC 39:109.

S. sclerotiorum (Lib.) de Bary: stem rot, pourridié sclérotique: on 2 BC 42:106, 47:115, [535].

Sclerotium delphinii Welch: basal dry rot, pourridié sclérotique: on 2 BC 35:73, 49:111.

S. tuliparum Kleb. (*Rhizoctonia t.* (Kleb.) Whetz. & Arth.): gray bulb rot, pourriture grise du bulbe: on 2 BC 41:99, 49:111, 52:121, [535], Ont 35:73, NB 27:100, [1138].

Typhula sp.: snow mold, moisissure nivéale: on 2 BC 43:117, [535].

Tobacco necrosis virus (nicotiana virus 11): isolated from 2 BC 59:91, NB 50:132.

Tulip breaking virus: breaking, bigarrure des fleurs: on 2 BC 30:93, [535], Man NB 43:117, Ont 36:85, PEI 37:85. The disease was general in BC until roguing out of affected plants was practised in commercial plantings.

Topple, affaissement: on 2 BC 47:115, 52:121, [535], Man 39:109, Ont Que 57:130, NB 55:127; mostly confined to bulbs being forced in the greenhouse.

Tussilago L.

COMPOSITAE

Low perennial herbs of Eurasia and n. Africa.

1. *T. farfara* L., coltsfoot, pas d'âne; introduced from Europe and now from Nfld to Ont.

Puccinia poarum Niels.: 0 I on 1 NS [15, p. 164; 1138].

Typha L.

TYPHACEAE

Paludal or subaquatic herbs of tropical and temperate regions.

1. *T. latifolia* L., common cat-tail, quenouille; Nfld to Alaska and s. in the US and Mexico; also in Eurasia and n. Africa.

Heterosporium maculatum Klotzsch: on dead leaves of 1 Man [93, p. 120].

Leptosphaeria eustoma (Fckl.) Sacc., sensu Berl., and *L. typhicola* Karst.: on 1 BC [50].

Mycosphaerella typhae (Lasch) Lindau: on 1 BC [50].

Peniophora sambuci (Pers.) Burt: on *T.* sp. Man [93, p. 78]; see *Acer*.

Ulmus L.

ULMACEAE

Trees or shrubs of e. N. America and Eurasia.

1. *U. americana* L., white elm, orme blanc; in Canada from Nfld and NS to e. Sask. The tree produces one of the most useful hardwoods in Canada, valuable for its size, strength and toughness; the wood is used in manufacturing cheese boxes and other veneer products, inexpensive furniture, etc. The tree is also widely used for street and ornamental planting.
2. *U. glabra* Huds. (*U. montana* With.); Europe and Asia. 2a, *U. g.* var. *camperdownii* Rehd.
3. *U. parvifolia* Jacq., Chinese elm, orme japonais; China and Japan; apparently rarely planted in Canada.
4. *U. pumila* L., Siberian elm, orme de Sibérie; e. Siberia to Turkestan; widely planted but most frequently sold as Chinese elm.
5. *U. rubra* Muhl. (*U. fulva* Michx.), slippery elm, orme rouge; in Canada in s. Que and s. Ont; the wood is similar to that of 1.
6. *U. thomasi* Sarg., rock elm; in Canada in s.w. Que and s. Ont; the wood is extremely hard, tough and strong.

Aleurodiscus cerussatus (Bres.) Höhn. & Litsch.: on 1 Man [93, p. 75; 599].

Anthostoma gastrinum (Fr.) Sacc.: on *U.* sp. Ont F63:69.

Apioportha apiospora (Ell. & Ev.) Wehm.: on 1 Ont F60:66.

Armillaria mellea (Vahl ex Fr.) Kummer: root rot, pourridié-agaric: on *U.* sp. Que 38:95; on 1 Ont F54:76.

Camarops microspora (Karst.) Shear (*Phaeospora helvetica* Nits.): on *U.* sp. Canada, Macoun 284, [989, p. 588].

Camarosporium cruciatum (Fckl.) Sacc.: on twigs of 1 Man [93, p. 132].

Cephalosporium sp.: wilt, flétrissure: from 1 NB F58:28.

Ceratocystis ulmi (Buism.) Moreau (*Ceratostomella u.* Buism.): Dutch elm disease, maladie de l'orme: on *U.* sp. Ont 48:102, F57:61, Que 44:102, F58:35, NB 57:121, F57:24, F58:26. This destructive disease has been gradually spreading through s. Ont, s. Que and NB. For details of the spread see the Plant Disease Survey and the annual reports of the Forest Insect and Disease Survey; for its history in Que, see Pomerleau [854]. Microendospores in the organism are reported [807] and growth in liquid culture is described [321].

Chaetomium globosum Kze.: from seed of *U.* sp. Ont [1009].

Chalaropsis thielavioides Peyr.: black mold, moisissure noire: on branches of 4 Que 59:85.

Ciborinia pseudobifrons Whetz. ex Groves & Bowerman: on *U.* sp. ?Que [376].

Collybia velutipes (Curt. ex Fr.) Kummer: white spongy rot, carie blanche spongieuse: on wood of *U.* sp. NS [1138].

- Coprinus domesticus* Fr.: on old logs, especially 1 Man [93, p. 107].
- Corticium pelliculare* Karst.: on 1 Man [93, p. 76]; see *Abies*.
- C. roseum* Pers. ex Fr.: on 1 Man [93]; see *Salix*.
- C. vellereum* Ell. & Cragin: on or from *U. sp.* Ont, 4 Man [796]; on bark of *U. sp.* NS [1138]; on 4 Man 48:103.
- Cryptosporella hypodermia* (Fr.) Sacc.: on 1 Ont F60:66.
- Cytospora ambiens* Sacc.: on *U. sp.* Sask F54:99; on 1 NS F63:37.
- C. chrysosperma* (Pers.) Fr.: on 1 Sask F51:145.
- Daedalea unicolor* Bull. ex Fr.: on *U. sp.* BC F57:86, [1199]; see *Acer*.
- Daldinia concentrica* (Bolt. ex Fr.) Ces. & de Not.: on *U. sp.* [1138].
- Diatrype hochelagae* Ell. & Ev.: on old 1 Man [93, p. 59].
- Dinemasporium robiniae* Gerard: on old branches of 1 Man [93, p. 133].
- Diplodia melaena* Lév.: on dead twigs of 1 Man [93, p. 133].
- Dothiorella ulmi* Verrall & May: wilt, flétrissure céphalosporique: on 1 Ont F55:67, 56:80, NS 36:67, [1138].
- Favolus alveolaris* (DC. ex Fr.) Qué.: from 1 Que [971].
- Fomes fraxineus* (Bull. ex Fr.) Cke.: from *U. sp.* Que [971].
- F. ignarius* (L. ex Fr.) Kickx: white trunk rot, carie blanche du tronc: on *U. sp.* NB 26:31, [1138]; on 1 Ont 24:49, F54:72; on 6 Ont F55:59.
- Fusarium* spp.: from 1: *F. acuminatum* Ell. & Ev. and *F. sporotrichioides* Sherb. from discolored twigs, Que; *F. poae* (Pk.) Wr. and *F. semitectum* Berk. & Rav. from twigs affected by dieback, Man; *F. solani* (Mart.) App. & Wr. from wood, Ont Que [335].
- Ganoderma applanatum* (Pers. ex Wallr.) Pat. (*Fomes applanatus* (Pers. ex Wallr.) Gill.): white mottled rot, carie blanche madrée: on *U. sp.* PEI [1138].
- Gloeosporium ulmeum* Miles [*Cylindrosporella ulmea* (Miles) Arx, 15a, p. 145]: on leaves of 1 NS [1138].
- Gnomonia ulmea* (Schw.) Thüm. (*Dothidella ulmi* auct.; stat. conid. *Gloeosporium ulmeum*, q.v.): leaf spot, tache des feuilles: on *U. sp.* NB Nfld F53:24, NB PEI F55:24, PEI 29:60; on *U. sp.* NB PEI, 1 NS [1138]; on 1 Sask Man [93, p. 56], Man Ont Que 24:49, NB 26:34, NS 38:94; on 23 Ont 46:80; on 4 Man 42:95, Ont 38:95, Que 43:99, NS 51:109; on 5 Que 31:82. The perfect state was found fully developed on *U. sp.* Que 39:100; and 1 Ont 46:80.
- Grandinia helvetica* (Pers.) Fr.: on bark of 1 Man [93, p. 80].
- Helotium ?albidum* (Rob.) Pat. and *H. renisporum* Ell. in Cke.: on fallen leaves of 1 Man [93, p. 40].
- Heterochaete bispora* Luck-Allen: on *U. sp.* Ont [619, p. 563].
- H. brachyspora* Luck-Allen: on *U. sp.* Ont [619, p. 566].
- Heterochaetella dubia* (Bourd. & Galz.) Bourd. & Galz.: on *U. sp.* Ont, deciduous trees Que [619].
- Hymenochaete tabacina* Sow. ex Lév.: on *U. sp.* NB [1138].
- Hysteropatella prostii* (Duby) Rehm: on 1 Man [93, p. 40].
- Marasmius ?androsaceus* Fr.: on living 1 Man [93, p. 91].
- Mollisia cinerea* (Batsch) Karst.: on old wood of 1 Man [93, p. 40].
- Mycosphaerella ulmi* Kleb. (stat. conid. *Phleospora u.* (Fr.) Wallr.): leaf spot, tache des feuilles: on 1 Ont 25:64, Que 46:80, NS 48:103, F53:23; on 2a Ont 31:126, Nfld F55:24.
- Nectria cinnabarina* Tode ex Fr.: coral spot, dépérissement nectrien: on *U. sp.* PEI 29:61; on *U. sp.* PEI, 1, 4 NS [1138]; on 1 Alta F54:112; on 3 BC [535], Sask [93, p. 46]; on 4 Sask Man F51:145, Ont 46:80, Que 41:86, NS 39:100, PEI 58:110.
- N. galligena* Bres.: nectria canker, chancre nectrien: on 4 NS F51:145.
- Nummularia repanda* (Fr.) Nits.: on branches of 1 Man [93, p. 60].
- Ostropa cinerea* (Pers.) Fr.: on fallen branches of 1 Man [93, p. 42].
- Panus torulosus* Fr.: on stumps, etc., of *U. sp.* NS [1138].
- Pellicularia flavescens* (Bon.) Rogers (*Corticium fenestratum* Overh.): on old 1 Man [93, p. 76].
- Peniophora affinis* Burt (*P. laevis* sensu Burt): on *U. sp.* Man 31:111.
- P. cinerea* (Fr.) Cke.: from twigs of *U. spp.* NB PEI F52:18; on *U. sp.* BC [1198], Que [793]; on dead branches of 1 Man [93, p. 77].
- P. longispora* (Pat.) Höhn.: on old 1 Man [93, p. 78].
- Pestalotia insidens* Zabriskie: on bark of living 1 Man; a *Monochaetia* [93, p. 131].
- Phyllosticta ulmicola* Sacc.: leaf spot, tache des feuilles: on 1 Man, 5 Ont 43:99.
- Pleurotus ulmarius* (Bull. ex Fr.) Kummer: white spongy rot, carie blanche spongieuse: on *U. sp.* PEI 29:61; on 1 Man [93, p. 94].
- Polyporus adustus* Willd. ex Fr.: from 1 Ont [791].
- P. brumalis* Pers. ex Fr.: from *U. sp.* Que [791].
- P. conchifer* (Schw.) Fr.: from *U. spp.* Ont [791]; on *U. sp.* NS [1138]; on fallen branches of 1 Man [93, p. 82]; on 1 Man Ont Que [810], NB NS F51:121. The cup-shaped structures were demonstrated to be splash cups from which the oidia were thrown [133].
- P. fumosus* Pers. ex Fr.: on 1 Ont [795]; on deciduous wood, perhaps of 1 Man [93, p. 72].
- P. galactinus* Berk.: from *U. sp.* Que [791].
- P. hirsutus* Wulf. ex Fr.: on *U. sp.* NB [1138]; on 1 Man [93, p. 83].
- P. obtusus* Berk.: white spongy rot, carie blanche spongieuse: on 1 Ont F52:73.
- P. pubescens* Schum. ex Fr.: from twigs of *U. spp.* NB PEI F52:18.
- P. resinosus* Schrad. ex Fr.: on 2 Ont [795].
- P. squamosus* Mich. ex Fr.: white mottled rot, carie blanche madrée: on stump of *U. sp.* NS [1138]; from *U. sp.*, 1 Ont [791]; on 1 NB 50:110, F53:26.
- P. tulipiferae* (Schw.) Overh.: on 1 Man [93, p. 84].
- Poria ferrea* (Pers.) Bourd. & Galz.: on twigs of *U. spp.* NB PEI F52:18.
- Solenia anomala* (Pers. ex Fr.) Fckl.: on *U. sp.* NS [1138].
- Sphaeropsis ulmicola* Ell. & Ev.: twig canker, chancre des rameaux: on *U. sp.* NS 33:61; on 1 Man [93, p. 140]; on 23 PEI 45:106.
- Strickeria obtucens* (Fr.) Wint. (*Teichospora o.* (Fr.) Fckl.): on bark or wood of 1 Man [93, p. 52].
- Taphrina ulmi* (Fckl.) Johans.: leaf blister, cloque des feuilles: on *U. sp.* Que 33:124; on 1 Que 32:109, F58:37, [735].
- Thyridium ?ambleium* (Cke. & Ell.) Sacc.: on branches of 1 Man [93, p. 57].
- Thyrostroma compactum* (Sacc.) Höhn.: twig blight,

Ulmus

brûlure des rameaux: on *U. sp.* Que, 4 Ont 37:68; on 4 Ont 50:119.

Trametes mollis (Sommerf.) Fr.: on *U. sp.* NS [1138].

Tubercularia ulmea Carter: coral spot, brulure des rameaux: on 1 Sask F51:145; on 4 BC Ont NB 53:112, Man 48:103, Que 47:102, NS PEI 51:109. Until it is clearly established that *T. ulmea* is distinct from *T. vulgaris* (q.v.), it is impossible to assess the relative importance of the two fungi. Nevertheless, 4 is so severely damaged by one of these fungi that it is no longer recommended in Que, 56:122.

T. vulgaris Tode: on 1 Alta F61:105, NS F53:27; on 2 PEI [1138].

Typhula gyrans (Batsch) Fr.: from sclerotia on dead leaves of 1 Man [93, p. 79].

Valsa ambiens (Pers. ex Fr.) Fr.: on 1 Man [93, p. 57].

Verticillium sp.: wilt, flétrissure verticillienne: on *U. sp.* Alta 49:99, Ont F55:58; from 1 NB F58:28.

Xylaria polymorpha (Pers.) Grev.: around stump of *U. sp.* NS [1138].

Virus: mosaic, mosaïque: on 1 NS 45:106.

Chemical injury: 2, 4-D on *U. sp.* Ont 53:112.

Ursinia Gaertn.

COMPOSITAE

Annual or perennial herbs or subshrubs of s. Africa; a few grown in the flower garden.

1. *U. pulchra* N.E.Br.

Fusarium oxysporum Schlecht. and *F. solani* (Mart.) App. & Wr.: from diseased basal parts of 1 NS [335].

Urtica L.

URTICACEAE

Herbs, shrubs or small trees with stinging hairs; species occurring in Canada all herbs; some species are semicosmopolitan.

1. *U. dioica* L., stinging nettle, ortie; naturalized from Europe and in Canada from Nfld and NS to Man.
2. *U. gracilis* Ait.; Nfld and NS to Alaska.
3. *U. lyallii* Wats.; Alaska, Alta and BC to Ore.
4. *U. viridis* Rydb.; in Canada in Sask and Alta.

Dendryphium vinosum (Berk. & Curt.) Hughes (*Helminthosporium urticae* Pk.): on *U. sp.* Man 31:114, but not in [93].

Didymella eupyrrina Sacc.: on 3 Alaska [175].

Leptosphaeria acuta (Moug.) Karst.: on 3 Alaska [175].

L. doliolum (Pers.) de Not.: on dead stems of 2 Man [93, p. 54].

Pistillaria micans Pers. ex Fr.: on dead stems of 2 Man [93, p. 79].

Puccinia caricina DC. (*P. caricis* (Schum.) Schroet. var. *urticata* (Kern) Arth.): 0 I on *U. sp.* Sask Ont 33:125; on *U. sp.*, 1, 2, 3 Ont [828]; on 1 Ont, 2 Alta Ont, 3 Alaska BC [15, p. 208]; on 2 Man Que 32:109; on 2 Man, 3 Alta Sask [93, p. 66]; on 3 Alaska [175], BC [1198], Sask 32:109; on 4 Sask 34:111.

Ramularia urticae Ces.: on 2 Man [93, p. 125]; on 3 Alaska [175], BC [1198].

Sclerotinia sclerotiorum (Lib.) de Bary: on 2 Man [93, p. 42].

Septoria urticae Desm. in Rob.: on *U. sp.* Alaska [175]; on 2 Man [93, p. 140].

Uvularia L.

LILIACEAE

Low herbs of e. N. America.

1. *U. perfoliata* L.; in Canada in w. Que and s. Ont.

Botrytis cinerea (stat. conid. of *Botrytinia fuckeliana* (de Bary) Whetz.): on 1 Que [963].

Vaccinium L.

ERICACEAE

Woody plants of the northern hemisphere.

1. *V. alaskense* Howell; Alaska to Ore.
2. *V. angustifolium* Ait. (*V. pennsylvanicum* Lam.), blueberry, bluet; in Canada from Nfld, NS and Que to Man and Sask. 2a, *V. a.* var. *nigrum* (Wood) Dole (*V. brittonii* Porter); Nfld and NS to Ont.
3. *V. cespitosum* Michx., English blueberry, bluets maganés; Labr, Nfld and NB to Man, Alaska and Calif.
4. *V. corymbosum* L., highbush blueberry, bluets en arbre; in Canada from NS to s. Que; also numerous cultivars in cult.
5. *V. macrocarpon* Ait., large cranberry, atoca; in Canada from Nfld and NS to Ont.
6. *V. membranaceum* Dougl., mountain huckleberry; in Canada from Ont to Alta and BC.
7. *V. myrtilloides* Michx. (*V. canadense* Kalm); in Canada from Nfld, NS and Que to Man, Sask and BC.
8. *V. myrtilus* L. (*V. oreophilum* Rydb.); in Canada in Alta.
9. *V. ovalifolium* J.E.Sm.; from Labr, Nfld and Que to Alaska.
10. *V. ovatum* Pursh, huckleberry; BC to Calif.
11. *V. oxycoccus* L. (*Oxycoccus palustris* Pers.), small cranberry, grisettes; Greenl, Labr, Nfld and NS to Man, Alta and Alaska; also in Eurasia.
12. *V. parvifolium* J.E.Sm., huckleberry; Alaska to Calif.
13. *V. scoparium* Leiberg, grouseberry; Alaska to Calif.
14. *V. uliginosum* L., ground-hurts, bluet trâinard; circumpolar; Alaska and Eurasia. 14a, *V. u.* var. *alpinum* Bigel., Nfld and NS to arctic Canada. 14b, *V. u.* var. *mucronatum* Herder.

15. *V. vitis-idaea* L. (chiefly *V. v. -i.* var. *minus* Lodd), partridge berry, pomme de terre; Greenl, Nfld and NS to Ont, Man, Sask, Alta, BC and Alaska.
- Acanthorhynchus vaccinii* Shear: blotch rot, pourriture tachetée: on leaves of 11 BC [50]; on 5 NS, and reported from PEI [1138].
- Agrobacterium rubi* (Hildebrand) Starr & Weiss: cane gall, tumeur de la tige: on 4 BC [535].
- A. tumefaciens* (Sm. & Towns.) Conn: crown gall, tumeur du collet: on 4 BC 32:68, 51:100, NS 57:109.
- Aleurodiscus aurantius* (Pers. ex Fr.) Schroet.: on *V.* sp. BC [599].
- Antennatula arctica* Rostr.: on 14 Greenl [899, p. 577].
- Aureobasidium pullulans* (de Bary) Arn. (*Pullularia p. de Bary*) Berkh.): associated with twig blight of 2 NB 51:101.
- Belonidium parksii* Cash: on *V.* sp. BC [1198].
- Bifuseptia tehonii* Darker: on 2 Ont Que, 7 Ont [239, p. 816].
- Botrytis cinerea* Pers.: gray mold, moisissure grise: on *V.* sp. NB 38:78, NS [1138]; on *V.* sp. following frost injury BC 52:96; on 1 Alaska [175]; on 2 NB 54:117, NS 41:70, 51:100; on 4 NS 51:100; on 7 NB 54:117.
- Cenangella pruinosa* Rostr.: on 14 Greenl [901, p. 59].
- Chrysomyxa ledi* de Bary var. *vaccinii* Ziller: II III on 12 BC F56:59, [955, 1198].
- Cladosporium oxycocci* Shear: on 5 NS [1138].
- Diaporthe vaccinii* Shear: canker, chancre phomopsien: on 5 NS 62:82.
- Dothidella vaccinii* Rostr.: on living leaves of 14 Greenl [899, p. 566; 901, 902].
- Dothiorella latitans* (Fr.) Sacc. (*Phyllochora l.* (Fr.) Sacc.): on 14 Greenl [899]; on 15 Alaska [175], Yukon [600], Yukon Frank ?Keew [604].
- Exobasidium comosum* Ell. & Ev. sp. inedit.: on 9 Alaska [175].
- E. cordilleranum* Savile var. *cordilleranum*: on 9, 12 BC [958, p. 649].
- E. cordilleranum* Savile var. *minor* Savile: on 6 BC [958, p. 650].
- E. dimorphosporum* Savile: on 3 BC [958, p. 654].
- E. parvifolii* Hotson: on 9 BC [1198], but this species is a synonym of *E. vaccinii*, fide [958].
- E. vaccinii* Wor. sensu lat.: red leaf, rouge: on *V.* spp. Man [93, p. 77], Que 56:113, NB PEI 48:90, NS 41:70, PEI 34:61, Nfld 57:109; on 2, 2a, 7 NS 51:100; on 2 NB, 4 NS [1138]; on 3, 9, 11, 14, 14b, 15 Alaska [175]; on 5 BC 61:99, NB 32:65, NS PEI 35:52, PEI 37:57; on 6, 9, 12, 13 BC [1198]; on 9 Alaska [1038]; on 14 Greenl [901, 902]; on 14, 15 Greenl [899].
- E. vaccinii* var. *vaccinii*: on 2 Ont Que, 4 Nfld, 7 BC Que NS, 9 BC, 11 BC Que Nfld, 12, 13 BC, 15 BC Que [958].
- E. vaccinii-uliginosi* Boud. sensu lat.: on 14a Frank, 15 Frank Mack Que [605].
- E. vaccinii-uliginosi* var. *vaccinii-uliginosi*: on 14 Keew Que Nfld [958].
- Fungi from decaying fruits in NS: *Acanthorhynchus vaccinii* Shear, *Fusicoccum putrefaciens* Shear, *Guidnardia vaccinii* Shear, *Sporonema oxycocci* Shear on 5, 15; *Ceuthospora lunata* Shear, *Diaporthe vaccinii* Shear, *Glomerella cingulata* (Stonem.) Spauld. & Schrenk, *Penicillium* sp., *Pestalotia vaccinii* (Shear) Guba on 5; *Botrytis* sp. on 15.
- Gibbera compacta* (Pk.) Shear (*Venturia c.* Pk.): leaf spot, tache des feuilles: on 5 NB 37:57, NS 34:111, 38:81, [1138]; ? on 7 Sask Man [93, p. 56].
- G. conferta* (Fr.) Petr.: on *V.* sp. Frank [52], Que [53].
- G. myrtilli* (Cke.) Petr.: on 9 Que [53].
- G. vaccinii* Fr.: on 15 Alaska [175].
- Gloeosporium minus* Shear (as *G. minor*): on fruit of *V.* sp. NB 38:80, [1138].
- Godronia cassandrae* Pk. f. *vaccinii* Groves [Canad. J.Bot. 43:1214. 1965] (stat. conid. *Fusicoccum putrefaciens* Shear): canker, chancre: on *V.* sp. Alaska [175]; on 4 BC 43:92, [535], Que 31:67, 61:98, NS 47:96; from fruits of 5 NB 38:80, [1138], NS 54:118. The fungus causes a serious disease on 4 [228a].
- G. urceoliformis* (Karst.) Karst.: on 14 Labr. [Canad. J.Bot. 43:1250. 1965].
- Glomerella cingulata* (Stonem.) Spauld. & Schrenk: anthracnose, anthracnose: on *V.* spp. Que 59:78, NS 56:113.
- Guignardia vaccinii* Shear: on 5 NS [1138]; see fungi on fruits of 5.
- Hendersonia* sp.: from stem canker on *V.* sp. NS 56:113.
- Hymenochaete tabacina* (Sow. ex Fr.) Lév.: on *V.* sp. BC [1198].
- Hypoderma degenerans* (Karst.) Nannf.: on *V.* sp. Greenl [604].
- Leptostroma punctiforme* Wallr.: on 15 Greenl [899].
- Leptothyrium conspicuum* Dearn. & House: on 9, 12 Alaska [175].
- Lophodermium cladophilum* Rehm: on 2 NS [1138]; on 12 BC [1198].
- L. hypophyllum* (Dearn. & House) Shear: on 15 Alaska [1038].
- L. maculare* (Fr.) de Not.: on 14 Frank [962], Greenl [603, 604, 899, 901, 902].
- L. melaleucum* (Fr.) de Not.: on 10 BC [1203]; on 15 Greenl [899], NS 56:113.
- L. oxycocci* (Fr.) Karst.: on 11, 15 Alaska [175].
- Meliola nidulans* (Schw.) Cke.: on 15 Que [52].
- Microsphaera penicillata* (Wallr. ex Fr.) Lév. var. *vaccinii* (Schw.) W.B.Cke. (*M. alni* (Wallr.) Salm. var. *v.* (Schw.) Salm.): powdery mildew, blanc: on *V.* sp. NS 40:73, PEI 48:90, Nfld 61:98; on *V.* sp. 2, 7 NS [1138]; on 1, 12 Alaska [175]; on 2 NS 53:101; on 5 BC 61:99; on 7 NS 53:101; on 12 BC [1198].
- Monilinia oxycocci* (Wor.) Honey: hard rot, pourriture sclérotique: on 1, 12 Alaska; on 5 BC 61:99, NB 38:81, [1138].
- M. vaccinii-corymbosi* (Reade) Honey (*Sclerotinia oxycocci* auct. non. Wor.): twig and blossom blight, pourriture sclérotique: on *V.* spp. NB NS PEI 48:91; on 4 NS 57:109, a destructive disease especially in second-crop fields. The fungus occurs often in association with *Botrytis cinerea* (q.v.).
- Mycosphaerella minor* (Karst.) Johans.: on *V.* sp. Frank, 14 Labr [52]; on 9 Que [53].
- M. vaccinii* (Cke.) Schroet.: on *V.* spp. Frank Labr [52]; on 14 Frank [604], Frank Labr [962], Greenl [603].
- Naevia oxycocci* Dearn.: leaf blight, brûlure des feuilles: on 5 Que 48:92, NB 41:71, 42:82, [1138].
- Peniophora incarnata* (Pers. ex Fr.) Karst.: on *V.* sp. BC [1198].
- P. vermifera* Bourd.: on *V.* sp. BC [1152].
- Pestalotia vaccinii* (Shear) Guba: leaf spot and fruit rot, pestalotiose: from fruit of *V.* spp. NS 52:97.

Vaccinium

- Phoma cymbispora* (Berk. & Curt.) Sacc. and *P. leptidea* (Fr.) Sacc.: on 14 Greenl [899].
- Phomopsis vaccinii* Shear: dieback, brûlure phomopsienne: on *V. spp.* NS 56:114.
- Phyalospora vitis-idaeae* Rehm: on 15 Que [53].
- Plectosphaera clarae-bonae* (Speg.) Theiss.: on 15 Que [53].
- Podosphaera clandestina* (Wallr. ex Fr.) Lév. (*P. myrtillina* Kze.): on 14 Alaska [175], Labr [604], Greenl [899, 901].
- Pucciniastrum goeppertianum* (Kühn) Kleb. (*Calyptospora goeppertiana* Kühn): witches'-broom rust, rouille-balai de sorcière: on *V. spp.* NB 38:78, NB NS PEI 48:90, NS 30:64, Nfld 58:100; on *V. sp.*, 2, 15 Ont [828]; on *V. sp.*, 9, 12, 14, 15 Alaska [175]; on *V. sp.*, Man Ont, 15 Sask [93, p. 63]; on 2, 7 Ont 24:48, [816]; on 2 NS Nfld, 8 Alta, 9 Alaska, 15 Alaska Sask [15, p. 20]; on 4 NS 52:96; on 6, 9, 10, 12, 13, 15 BC [1198]; on 10 BC F53:156; on 15 Yukon F62:122, Sask F51:145, NS 56:113.
- Pady [816] noted that the intradermal teliospores separate the species from typical *Pucciniastrum* and the germ pores in the upper and inner corners of each cell of the thick-walled teliospores separate it from other species with intradermal teliospores.
- P. vaccinii* (Wint.) Jørstad (*P. myrtilli* (Schum.) Arth., *P. vacciniorum* Lagerh., *Thekopsora v.* Karst.): leaf rust, rouille de la pruche: on *V. sp.*, 1, 3, 8, 9, 14 Alaska [175]; on *V. sp.*, 2, 4 Ont [828]; on 1, 3 Alaska, 2 Sask, 4 Ont, 9 Alaska, 13 Alta [15, p. 18]; on 2 NS PEI, 15 NS [1138]; on 2, 7 Ont. [816]; on 2 NB 51:101, NS 53:101; on 3, 6 BC [1203]; on 5 Que 31:67, NS 52:97; on 6 Alta F63:105; on 7, 9, 13 BC [1198]; on 9 BC Que 52:97; early defoliation may adversely affect next year's crop of fruit, 62:83. The intradermal thin-walled teliospores distinguish the species from typical *Pucciniastrum* [816].
- Ramularia effusa* Pk.: leaf spot, tache ramularienne: on 2 NS 54:117.
- Rhytisma vaccinii* Schroet.: on 12 Alaska [175].
- Sphaerella myrtillina* Sacc.: on 14 Greenl [899].
- Sporomega degenerans* Fr.: on 14 Greenl [901].
- Sporonema oxycocci* Shear: on 11 Alaska [175].
- Synchytrium vaccinii* Thomas: red gall, tumeur rouge: on 5 NS 33:51, 125, 39:85, 48:92, [1138].
- Thelophora terrestris* Ehr. ex Fr.: on *V. sp.* BC [1198].
- Valsa delicatula* Cke. & Ell.: conidial state of the species was associated with *Phomopsis vaccinii* on *V. spp.* NS 56:114.
- Venturia circinata* Fr.: on 11 Greenl [899].
- V. myrtilli* Cke.: on 14 Greenl [899].
- Verticillium sp.*: from damped-off cuttings of 4 BC 53:101.
- Blueberry stunt virus: stunt, rabougrissement viral: on 4 NS 47:96, 48:91, 58:100, 61:99.
- Cranberry false-blossom virus: false blossom, fausse fleur: on 5 NS 33:50.
- Virus: mosaic, mosaïque: on 4 NS 57:110, 62:83.

Valeriana L.

VALERIANACEAE

Plants mostly in the temperate and colder regions of the northern hemisphere; one planted in flower gardens.

1. *V. capitata* Pall. ex Lk.; Alaska, Yukon and Mack; also in Eurasia.

2. *V. officinalis* L., garden heliotrope, valéraine; naturalized from Europe in NS and Que to Ont.
3. *V. septentrionalis* Rydb.; Nfld, Que and Ont to Yukon, Alaska and Calif.
4. *V. sitchensis* Bong.; Alaska and BC to Wash and Calif.

Puccinia commutata Syd.: 0 I III on 3 Alta, 4 BC [15, p. 262].

P. valerianae Carest.: on 1 Alaska [175]; unrecorded in N. America by Cummins; probably a misdetermination of *P. commutata*.

Rhizoctonia solani Kühn: crown rot, rhizoctone: on 2 Sask 33:67.

Sphaerella vagans Ell. & Ev.: on leaves of 4 BC [50].

Synchytrium perforatum Ell.: on 4 BC Alaska [541].

Veratrum L.

LILIACEAE

Perennial herbs of the northern hemisphere.

1. *V. californicum* Durand; BC to Calif.
2. *V. eschscholtzii* Gray (*V. eschscholtzianum* (Roem. & Schult.) Rydb.); Alaska and Alta to Ore.
3. *V. viride* Ait., white hellebore, vérâtre vert; in Canada in NB and Que.

Cercospora veratri Pk.: on 2 BC [963].

Helotium sp.: on 3 Alaska [1038].

Patinella aloysii-sabaudiae Sacc.: on *V. sp.* Alaska [175].

Phyllosticta melanoplaca Thüm.: on ?*V. sp.* Alaska [175]; on 2 BC [963].

Puccinia veratri Duby: II III on 1, 2 BC [15, p. 273]; on 2 Alaska [175]; on 2 BC [963]; on 3 Que 32:110.

Sclerotium durum Fr.: on *V. sp.* Alaska [175].

Verbascum L.

SCROPHULARIACEAE

Tall biennial herbs of the Old World.

1. *V. blattaria* L., moth mullein, herbes aux mites; naturalized from Europe in Que and Ont.

Septoria verbascicola Berk. & Curt.: on 1 Ont 31:126.

Verbena L.

VERBENACEAE

Annual or perennial herbs or subshrubs of temperate or tropical regions.

1. *V. hastata* L., blue vervain; in Canada from NS and NB to BC.
2. × *V. hybrida* Voss, (probably *V. peruviana* Britt. × *V. spp.*), garden verbena, verveine.
3. *V. rigida* Spreng.; Brazil and Argentina.

Botrytis cinerea Pers.: leaf blight, moisissure grise: on 3 Que 56:132.

Oidium sp.: powdery mildew, blanc: on 2 BC 50:132.
Phyllosticta verbenicola Martin: on 1 Man [93, p. 136].
Septoria verbenae Rob. & Desm.: leaf spot, tache septorienne: on 1 Que 31:102, 32:110, 33:125.
 Aster yellows virus: aster yellows, jaunisse de l'aster: on *V.* sp. NB 37:85.

Veronica L. SCROPHULARIACEAE

Herbs or subshrubs of the northern hemisphere.

1. *V. alpina* L.; arctic regions s. to Labr and in Eurasia. 1a, *V. a.* var. *unalaschensis* Cham. & Schl. (*V. wormskjoldii* Roem. & Schult.); Greenl to Alaska and s. to Que.
2. *V. americana* (Raf.) Schw., brook lime; Nfld and NS to Alaska.
3. *V. fruticans* Jacq. (*V. saxatilis* Scop.); Greenl; also in Europe.
4. *V. latifolia* L. (*V. teucrium* L.), Hungarian speedwell, teucrlette; Europe; cult.
5. *V. longifolia* L.; introduced and naturalized from Europe in Nfld and NS to Que; many cultivars, among which is 5a, *V. l.* var. *sessilis* Miq.
6. *V. officinalis* L., common speedwell, véronique mâle; Nfld and NS to Ont and also in Eurasia. 6a, *V. o.* var. *tournefortii* (Vill.) Reichenb. (*V. t.* Vill.); Nfld, PEI and NS; also in Europe.
7. *V. peregrina* L., neckweed; Que to Man and Yukon; also Alaska to Ore.
8. *V. serpyllifolia* L., St. Paul's betony; naturalized from Europe in Greenl and Nfld to Ont.
9. *V. spicata* L.; introduced from Europe in Que.

Entyloma linariae Schroet.: on 2 Que [953].

Gloeosporium veronicae Dearn. & House [*Discogloeum v.* (Lib.) Petr.]: on 6a BC [535], but not distinct from *G. veronicarum* (q.v.).

G. veronicarum Ces. [*Discogloeum veronicae* (Lib.) Petr.]: leaf spot, anthracnose: on 6 Ont, 6a BC 48:115; on 5a, as *G. sp.*, Que 57:129.

Leptosphaeria striata Wint.: on 1 Greenl [899].

Peronospora grisea (Ung.) de Bary: downy mildew, mildiou: on *V.* sp. NB 60:68; on 3 Greenl [902]; on 7 Man [93, p. 30]; on 8, as *P. sordida* Berk., PEI 26:40, [1138].

Phoma veronicae Roum.: on 1 Greenl [899].

Pleospora comata Auersw. & Niessl. (*Pyrenophora c.* (Niessl) Sacc.): on 3 Greenl [900].

Puccinia albulensis Magn.: III on 1a BC [15, p. 335].

P. veronicarum DC. (*Leptopuccinia v.* (DC.) Rostr.): III on 1 Greenl [899, 901, 902; cf. 15, p. 259].

Ramularia veronicae Fckl.: leaf spot, tache ramularienne: on 4 Ont 44:118, 45:122.

Selenophoma drabae (Fckl.) Petr. (*Septoria semilunaris* Johans.): on 3 Greenl [899].

Septoria veronicae Desm.: leaf spot, tache septorienne:

on 1 Que 56:132; on 3 Greenl [899]; on 5 cult. Man 43:117, [93, p. 140].

Sphaerotheca fuliginea (Schlecht. ex Fr.) Poll. (*S. humuli* (DC.) Burr. var. *f.* (Schlecht.) Salm.): on 5 cult. Man [93, p. 45]; only *S. fuliginea* occurs on the Scrophulariaceae, fide Savile.

S. macularis (Wallr. ex Fr.) Magn. (*S. humuli* (DC.) Burr.): powdery mildew, blanc: on *V.* sp. NB 60:68; on 5a Que 55:127; on 9 Sask 36:83.

Aster yellows virus: aster yellows, jaunisse de l'aster: on 9 NB 36:83, 37:84.

Veronicastrum Fabr. SCROPHULARIACEAE

Tall perennial herbs of N. America and Asia.

1. *V. virginicum* (L.) Farw. (*Veronica virginica* L.), Culver's root; in Canada from Que to Man.

Peronospora grisea (Ung.) de Bary: on 1 NS [1138].

Viburnum L. CAPRIFOLIACEAE

Shrubs or small trees of the northern hemisphere.

1. *V. acerifolium* L., arrowwood; Que to Ont.
2. *V. alnifolium* Marsh., moosewood, bois d'original; PEI and NS to Ont.
3. *V. carlesii* Hemsl.; Korea.
4. *V. cassinoides* L., withrod, bourdaine; Nfld and NS to Ont.
5. *V. dentatum* L., arrowwood; e. US.
6. *V. edule* (Michx.) Raf. (*V. pauciflorum* L. Pylaie), pimbina, pimbina; Labr, Nfld, NS and NB to Ont.
7. *V. lantana* L., twistwood, mancienne; Europe; spread from cult. in Ont.
8. *V. lentago* L., nannyberry, alisier; Que to Man.
9. *V. opulus* L., gelder rose or snowball, quatre saisons; Europe; frequently planted and occasionally escaping.
10. *V. rafinesquianum* Schultes (*V. pubescens* auct.); Que to Man.
11. *V. sargentii* Koehne; n.e. Asia.
12. *V. trilobum* Marsh. (*V. opulus* L. var. *americanum* Ait.), pimbina, pimbina; Nfld and NS to BC.

Ascochyta viburni Sacc.: leaf spot, tache foliaire: on 9 BC [535].

Botrytis cinerea Pers.: gray mold, moisissure grise: on 1 NS 36:83, [1138].

Ceratobasidium anceps (Bres. & Syd.) Jackson: on 2 Que [495].

Cercospora penicillata (Ces.) Fres. (*C. opuli* (Fckl.) Höhn.): on 6 Sask, 9 Man [93, p. 115]; Chupp doubts the occurrence of this species in N. America.

Viburnum

Cercospora varia Pk.: leaf spot, tache cercosporéenne: on *V. sp.* Alaska [175, 341]; on 3 NS 55:118; on 6 Sask Man, 10 Man [93]; on 9 Ont 43:100; on 12 Man 42:107.

Cladosporium sp.: on 6 Alaska [175].

Coleosporium viburni Arth.: rust, rouille: II III on 4 Que 34:111, NB 42:96, NB NS [1138], NS 43:100; on 4 Ont, 8 Man [15, p. 40]; on 4, 8, 10 Ont [828]; on 6 Que F61:54; on 8 Man 33:96, [93, p. 63], Ont 43:100.

Corticium centrifugum (Lév.) Bres.: on wood of *V. sp.* [93, p. 75]; see *Abies*.

C. contiguum Karst. (*C. crustaceum* (Karst.) Höhn. & Litsch.): on bark and wood of *V. sp.* Man [93].

Cryptosporella lentaginis (Ell. & Ev.) Rehm: on twigs of 8 Man [93, p. 58].

Dermea viburni Groves: on *V. spp.* Ont Que [370, p. 387].

Diaporthe viburni Dearn. & Bisby: on 8, 9 Man [93, p. 57].

Diatrype ?asterostoma Berk. & Curt.: on fallen branches of ?*V. sp.* Man [93, p. 59].

Diatrypella ?discoidea Cke. & Pk.: on branches of 9 Man [93, p. 59].

Didymella manitobiensis Dearn. & Bisby: on dead twigs of 9 Man [93, p. 53].

Didymium melanospermum (Pers.) Macbr.: on *V. sp.* Man [93, p. 26].

Didymosphaeria epidermidis (Fr.) Fckl.: on twigs of 8, 9 Man [93, p. 54].

Eutypa milliaria (Fr.) Sacc.: on bare wood of 8 Man [93, p. 57].

Fomes conchatus (Pers. ex Fr.) Gill.: on dead 8 Man [93, p. 81].

Heteropatella viburni Dearn. & Bisby: on branches of 9 Man [93, p. 133].

Hypoxylon fuscum Pers. ex Fr.: on 9 Man [93, p. 59].

Hysterographium flexuosum (Schw.) Rehm: on twigs of 8 Man [93, p. 43].

H. fraxini (Pers. ex Fr.) de Not.: rarely on 8, 9 Man [93].

Leptosphaeria ?borealis Ell. & Ev.: on twigs of 9 Man [93, p. 54].

Massaria plumigera Ell. & Ev. var. *tetraspora* Dearn. & House: on branches of 9 Man [93, p. 56].

Metasphaeria anisometra (Cke. & Harkn.) Sacc.: on twigs of 10 Man [93, p. 54].

Microsphaera penicillata (Wallr. ex Fr.) Lév. (*M. alni* (DC.) Wint.): powdery mildew, blanc: on 4 NS [1138]; on 5 cult. Man 43:100; on 8 Man [93, p. 44]; on 12 Que 13:125.

Naematelia nucleata (Schw.) Fr.: on dead branches of *V. sp.* Man [93, p. 74].

Nectria cinnabarina Tode ex Fr.: on *V. sp.* Alaska [175].

Pestalotia bicilia Dearn. & Bisby: on twigs of 9 cult. Man [93, p. 131].

Pezicula minuta Pk.: on 8 NS [1138].

Phialea vulgaris (Fr.) Rehm: on fallen branches of *V. sp.* Man [93, p. 41].

Phyllosticta lentaginis Sacc. & Syd.: leaf spot, tache foliaire: on 1 Ont 43:100; on 9 Que 59:85; on 10 Man [93, p. 135].

P. punctata Ell. & Dearn.: on 9 Ont, 10 Man 43:100.

Plasmopara viburni Pk.: downy mildew, mildiou: on 7, 9, 11, 12 Ont 43:100; on 9 Ont 52:108, Que 58:111.

Polyphorus nidulans Fr.: on dead 8 Man [93, p. 83].

Puccinia linkii Klotzsch: rust, rouille: III on 6 Alaska [175], BC [1198], Sask 32:110, Sask Man [93, p.

69], Sask Man Que [15, p. 337], Ont [828], Que [197]; on 12 NS 43:101, [1138].

Ramularia viburni Ell. & Ev.: leaf spot, tache ramularienne: on 8 Ont 43:101; on 9 Man [93, p. 125].

Rhabdospora interrupta (Berk. & Curt.) Sacc.: on 9 Alaska [175].

R. viburni-opuli Dearn. & Bisby: on twigs of 9 Man [93, p. 136].

Stictis fusca Ell. & Barth.: on twigs of 8, 9 Man [93, p. 42].

S. radiata L. ex Pers.: on twigs of 8 Man [93].

Tympanis fasciculata Schw.: on *V. spp.* Ont Que [372]; on 8 NS [1138].

Verticillium albo-atrum Reinke & Berth.: wilt, flétrissure verticillienne: on *V. sp.* Ont 61:109.

Vicia L.

LEGUMINOSEAE

Herbs of the northern hemisphere and temperate S. America.

1. *V. americana* Muhl., pea vine; Que to Man and Alaska and in the US. 1a, *V. a.* var. *angustifolia* Nees (*V. sparsifolia* Nutt.); Man to BC and Calif. 1b, *V. a.* var. *truncata* (Nutt.) Brewer (*V. oregana* Nutt.); Man to BC and Calif.
2. *V. angustifolia* Reichard, vetch, pois sauvage; naturalized from Europe in E. Canada and Man.
3. *V. caroliniana* Walt., wood vetch; in Canada in s. Ont.
4. *V. cracca* L., tufted vetch, jargeau; naturalized from Europe in every province but common in E. Canada.
5. *V. faba* L., broad bean, gourgane; probably native to n. Africa and s.w. Asia; cult. to a limited extent in Canada.
6. *V. gigantea* Hook; Alaska to Calif.
7. *V. hirsuta* (L.) S.F.Gray, hairy vetch, petit vesce; naturalized from Europe from Nfld to BC.
8. *V. sativa* L., spring vetch, vesce commune; cult. for forage and occasionally escaped from Nfld to Ont.
9. *V. villosa* Roth, hairy vetch, vesce; cult. as a forage crop; naturalized from Europe in Ont and Man.

Alternaria sp.: associated with pod blight of 5 Man 43:43, Que 41:30.

Ascochyta fabae Speg.: leaf spot, ascochytose: on 5 BC [535].

A. pisi Lib. or *A. sp.*: leaf and pod spot, ascochytose du pois: on 1, 2 BC [535]; on 5 Alta 37:24; on 8 BC [535], Que 34:24, PEI 25:23, 29:24, [1138]; on 9 BC [535], Ont 45:28, 49:24.

A. ?viciae Lib.: on 9 cult. Man [93, p. 132].

Botrytis cinerea Pers.: gray mold or chocolate spot, moisissure grise: on 5 Alaska [175], BC 40:31, [535], Que 54:59.

Cercospora zonata Wint. (*C. fabae* Fautrey): leaf spot, tache cercosporéenne: on 5 NS 51:44.

Colletotrichum viciae Dearn. & Overh. [*C. dematium* Pers. ex Fr.] Grove f. *truncata* (Schw.) Arx.: anthracnose, anthracnose: on 9 NS 51:26, 52:29.

Erysiphe polygoni DC. ex Mérat: powdery mildew, blanc: on 4 PEI 26:40, 30:99, [1138]; on 5 BC 52:44; on 6 Alaska [175].

Fungi from seed: of 5 in BC: *Alternaria consortialis* (Thüm.) Groves & Hughes, *A. tenuis* auct. sensu Wiltshire, *Aureobasidium pullulans* (de Bary) Arn., *Botrytis cinerea* Pers., *Chaetomium cochliodes* Pall., *Cladosporium cladosporioides* (Fres.) De Vries, *Cunninghamella elegans* Lendner, *Epicoccum neglectum* Desm. [374]; *Fusarium acuminatum* Ell. & Ev., *F. equiseti* (Cda.) Sacc., *F. poae* (Pk.) Wr. [334, 374]; *Melanospora papillata* Hotson, *Nigrospora oryzae* (Berk. & Br.) Petch, *Papularia arundinis* (Cda.) Fr., *Penicillium palitens* Westling, *Scopulariopsis stercoraria* (Lk.) Hughes, *Sordaria fimicola* (Rob.) Ces. & de Not., *Stemphylium botryosum* Wallr., *Trichocladium asperum* (Cda.) Harz, *Trichothecium roseum* (Pers.) Lk. [374]. Of 9 in Ont: *Alternaria tenuis*, *Chaetomium funicola* Cke., *C. globosum* Kze., *Cladosporium cladosporioides*, *Nigrospora sphaerica* (Sacc.) Mason, *Trichoderma viride* Pers., *Trichothecium roseum* [374].

Fusarium spp.: foot rot, pourridié fusarien: *F. sp.* on 5 PEI 57:53; *F. acuminatum* Ell. & Ev., *F. oxysporum* Schlecht. from plants of 8 Man 39:28, [335]; *F. acuminatum*, *F. oxysporum*, *F. o. var. redolens* (Wr.) Gordon, *F. solani* (Mart.) App. & Wr. from 5 Man 41:30, 43:43, [335]; *F. avenaceum* (Fr.) Sacc. from roots of 1 Alta [211].

F. oxysporum Schlecht. f. *fabae* Yu & Fang: wilt, flétrissure fusarienne: on 5 Que 53:55 et seq., [335].

Leptosphaeria sp.: on 5 Alaska [175].

Microsphaera penicillata (Wallr. ex Fr.) Lévl. (*M. alii* (DC.) Burr.): powdery mildew, blanc: on 1b Sask [93, p. 44]; on 4 Que 31:126.

Ovularia schwarzi Magn.: on 9 BC 33:125.

Peronospora narbonensis Gäum.: on 1 BC [535], Man [93, p. 30].

P. viciae (Berk.) Casp.: downy mildew, mildiou: on 8 BC 37:17, 39:28, [535].

P. viciae-sativae Gäum.: on 1a Sask Man [93, p. 30].

Phytophthora cactorum (Leb. & Cohn) Schroet. var. *applanata* Chester: black rot, pourridié noir: on 9 BC 55:38.

?*Pseudomonas pisi* Sackett: bacterial blight, brûlure bactérienne: on *V. sp.* Alta 26:11, 30:36.

Sclerotinia sclerotiorum (Lib.) de Bary: sclerotinia rot, pourriture sclérotique: on 5 Alta 31:34.

Stemphylium botryosum Wallr.: on 5 BC [535].

Thecaphora deformans Dur. & Mont.: on ?3 Ont [292, 957].

Uromyces coloradensis Ell. & Ev.: rust, rouille: 0 I III on *V. sp.* Alta 34:112; on 1 BC Alta Man, 1a Sask, 1b Ont [15, p. 301]; on 1 Sask 31:126, Man 34:112, Ont [828]; on 1, 4 Man [93, p. 72].

U. ervi West.: 0 I (II) III on 7 NS [956].

U. fabae (Grev.) de Bary ex Cke.: 0 I II III on *V. sp.* Alta 34:112, Que 25:23; on *V. sp.*, 4 Ont [828]; on 1 BC Sask Man, 1a, 1b Alta, 2 BC, 4 Que NS [15, p. 243]; on 1 Alta Sask Man, 1b Alta [93, p. 72]; on 3 Alta Sask 34:112; on 4 Ont 24:61, Que 31:126, NS 39:28, [1138].

Virus: mosaic, mosaïque: on 5 BC 40:31, 41:30, [535], Alta 37:23, Sask 43:43, Que 54:60, PEI 49:40. The infection was attributed to pea mottle virus NB

42:40, pea mosaic virus NB 54:60, and bean yellow mosaic virus BC 62:47.

?Boron deficiency, carence de bore: on 5 BC 58:50.

Vinca L.

APOCYNACEAE

Herbs or subshrubs of the Old World.

1. *V. major* L., periwinkle, pervenche; Europe; spread from cult. in s.e. US.
2. *V. minor* L., periwinkle, pervenche; Europe; spread from cult.
3. *V. rosea* L.; cosmopolitan in the tropics.

Puccinia vincae Berk.: rust, rouille: 0 II III on 1 Ont 28:100, 30:93, 34:93, [15, p. 324; 828].

Aster yellows virus: aster yellows, jaunisse de l'aster: on 3 NB 49:111, 51:120.

Viola L.

VIOLACEAE

Perennial herbs or rarely subshrubs in temperate zones of both the northern and southern hemispheres.

1. *V. adunca* J.E.Sm. (*V. muhlenbergii* Torr., *V. muhlenbergiana* Ging. in DC.); Que and Ont to Man and Alaska. 1a, *V. a. var. minor* (Hook.) Fern. (*V. labradorica* Schrank); Greenl, Labr, Nfld and NS to Man and Alaska.
2. *V. blanda* Willd.; Que to Ont and Man.
3. *V. canadensis* L., June flower; Que and Ont.
4. *V. canina* L.; Greenl.
5. *V. conspersa* Reichenb.; Que and Ont.
6. *V. cornuta* L., horned violet; Spain and the Pyrenees.
7. *V. cucullata* Ait., blue violet; Nfld, PEI and NS to Ont.
8. *V. epispila* Ledeb. ssp. *repens* (Turcz.) W.Bckr.; circumpolar; probably not distinct from 18.
9. *V. fimbriatula* J.E.Sm.; NS and PEI to Ont.
10. *V. glabella* Nutt.; Alaska to Calif.
11. *V. langsdoerffii* Fisch.; Alaska to Ore.
12. *V. mackloskeyi* Lloyd; BC to Calif.
13. *V. nephrophylla* Greene; Nfld, PEI, NB to Man, BC and Alaska.
14. *V. nuttallii* Pursh; Man to Alta.
15. *V. odorata* L., English violet, fleur de carême; Europe; also spread from cult.
16. *V. orbiculata* Geyer; BC to Ore., Idaho and Mont.
17. *V. pallens* (Banks) Brainerd, white snow-drops; Labr, Nfld and NS to Man and Alaska.

Viola

18. *V. palustris* L., marsh violet; Greenl, Nfld and Que to Man, Alaska and Calif.
19. *V. pedatifida* G. Don, prairie violet; Man to Alta.
20. *V. pensylvanica* Michx. (*V. eriocarpa* Schw.), yellow violet; US. 20a, *V. p.* var. *leiocarpa* (Fern. & Wieg.) Fern.; Que to Man.
21. *V. pubescens* Ait.; Que to Man.
22. *V. renifolia* Gray; Nfld and NS to Alta. 22a, *V. r.* var. *brainerdii* (Greene) Fern.; Labr, Nfld and NS to Man and Alaska.
23. *V. rugulosa* Greene (*V. canadensis* auct. non L.); Man to BC.
24. *V. selkirkii* Pursh; Greenl, Labr, Nfld and NS to Ont, Man, Alta and BC.
25. *V. septentrionalis* Greene; Nfld and NS to BC.
26. *V. soraria* Willd.; Que to Man.
27. *V. tricolor* L., pansy, pensée; Europe and adventive in N. America. 27a, *V. t.* var. *hortensis* DC, cultivated pansy, pensée cultivée.

Alternaria violae Gall. & Dorsett: leaf spot, tache alternarienne: on 27a Que 27:100, NB 25:72, 26:37, 27:97, [1138].

Ascochyta violae Sacc. & Speg.: leaf spot, tache ascochy-tique: on 27a BC 52:121, [535].

A. violicola McAlp.: on *V. sp.* cult. Alaska [175].

Botrytis cinerea Pers.: gray mold, moisissure grise: on 27 Alaska [175], BC 47:115, [535], NB 60:68.

Centrospora acerina (Hartig) Newhall: on *V. sp.* Alaska [175]; cause of considerable damage to 27a NS 60:121 et seq.

Ceratobasidium anceps (Bres. & Syd.) Jackson: on *V. sp.* Ont [495].

Cercospora granuliformis Ell. & Holw.: on 26 Ont 44:118.

C. violae Sacc. (*C. violae-tricoloris* Bri. & Cav.): leaf spot, tache cercosporéenne: on *V. sp.*, 27a NS [1138]; on 6 Ont 44:118, 51:120; on 27a BC [828], Man [93, p. 115], Ont Que 34:88, Man Ont Que NS 43:88, Ont 44:118, Que 55:127, NS 61:117.

Colletotrichum violae-tricoloris R.E.Sm. [*C. gloeosporioides* Penz.]: anthracnose, anthracnose: on 27a Ont 45:22, NB 26:35, NS 27:97, 35:70, NB NS [1138].

Fusarium culmorum (W.G.Sm.) Sacc.: from basal parts of 27a BC [335, 535].

Heteropatella umbilicata (Pers. ex Fr.) Jaap (*Septoria cercosperma* Rostr.): on 1, 4 Greenl [900].

Mycosphaerella tassiana (de Not.) Johans. (*Sphaerella pachyasca* Rostr.): on 1 Greenl [900].

Myrothecium roridum Tode: crown and stem rot, pourriture de la tige: on 27a BC 47:115, 50:133, 52:121; the cause of considerable damage to seed crops BC [535].

Phyllosticta violae Desm.: leaf spot, tache phyllostictéenne: on *V. sp.*, 23 Man [93, p. 136]; on 27a Man 45:123, NS 43:118, [1138].

Pleospora helvetica Niessl: on *V. sp.* Que [52].

P. rainierensis Wehm. (*P. asymmetrica* Wehm.): on 1 BC [50].

Puccinia canadensis Arth.: III on 16 BC Alta [15, p. 312].

P. ellisiana Thüm.: 0 I on *V. sp.* Ont [828]; on *V. spp.* Sask Man, 13 Sask [93, p. 67]; on 13 Sask [15, p. 119].

P. fergussonii Berk. & Br.: III on 11, 12, 13 BC, 18 Alaska [15, p. 313]; on 2, 8, 11, 18 Alaska [175].

P. ornatula Holw.: III on 10, 23 BC [15, p. 312].

P. violae (Schum.) DC.: rust, rouille: 0 I II III on *V. spp.* BC Alta Que PEI 25:82, NB NS 26:37, NB 30:100; on *V. sp.*, 1, 8, 10, 11, 18, 22a Alaska [175]; on *V. spp.* Sask Man, 1 Man, 13 Sask, 15 Man, 19 Sask Man, 21 Man, 22 Sask, 23 Sask Man, 27a Man [93, p. 72]; on *V. spp.* NB NS PEI, 7, 9, 17, 25 NS [1138]; on *V. spp.*, 1a, 2, 3, 5, 13, 17, 20, 21, 24, 25, 26 Ont [828]; on 5 Que, 13 Alta, 20, 21 Ont, 23 Alta BC, 25 Ont NS, 26 Ont [15, p. 311]; on 13 Que 32:110; on 19 Sask 29:79; on 21 Ont 31:126; on 23 Sask 30:100, Man 34:112, Que 33:125; on 27a BC 32:93, Man 43:118, NS 39:110. A very common rust.

Pythium sp.: isolated from decayed roots and bases of stems of 27a Ont 46:89.

Ramularia agrestis Sacc.: on 27a BC 33:125.

R. ionophila Davis: on 14 Sask, 23 Sask Man [93, p. 124]; ? on 10 Alaska [175].

R. lactea (Desm.) Sacc.: leaf spot, tache ramularienne: on *V. sp.* cult Alaska [175]; on 27a BC 43:118, [535].

Sclerotium delphinii Welch: crown and root rot, pourridié sclérotique: on 27a Que 44:118.

Septoria hyalina Ell. & Ev. on 18 Alaska [175].

S. violae West.: on *V. spp.* Man Ont [93, p. 140]; on 1a Labr [604].

Sphaerotheca fuliginea (Schlecht. ex Fr.) Poll. (*S. humuli* (DC.) Burr. var. *f.* (Schlecht.) Salm.): on 23, 27a Man [93, p. 45]; on 27a BC 30:90, Ont 55:127.

S. macularis (Wallr. ex Fr.) Magn. (*S. humuli* (DC.) Burr.): powdery mildew, blanc: on *V. spp.* BC [50]; on 6, 27a Ont 45:123; on 27a BC 37:80, Alta 42:107, Sask Que 36:80, Ont 58:121.

Synchytrium sp.: on 20 Ont [541].

S. aureum Schroet.: on *V. sp.* Alaska [983].

Urocystis violae (Sow.) Fisch. v. Waldh.: on 10 Alaska [175]; on 15 Ont [292].

Wettsteinina mirabilis (Niessl) Höhn.: on *V. sp.* Que [52].

Vitis L.

VITACEAE

Mostly climbing plants chiefly of the temperate region of the northern hemisphere.

1. *V. labrusca* L., fox grape; Ont and e. US; source of several cultivars in N. America; and *V. × labruscana* Bailey (*V. labrusca* × *V. ?vinifera*), another group of N. American cultivars.
2. *V. riparia* Michx. (*V. vulpina* auct. non L.), frost grape, vigne des battures; NS and Que to Ont and Man.
3. *V. vinifera* L., wine grape, la vigne; probably s.e. Europe; sparingly cult. in the Niagara Peninsula, Ont.
4. *V. vulpina* L.; e. US.

Other hosts: 5, *V. amurensis* Rupr. 6, *V. argenti-folia* Muns. (*V. lecontiana* House). 7, *V. coignetiae* Planch (*V. kaempferi* Rehd.). 8, *V. longii* Prince. 9, *V. piasezkii* Max.

Agrobacterium tumefaciens (Sm. & Towns.) Conn: crown gall, tumeur du collet: on 1 Ont 40:77, Que 31:70; on 3 Ont 52:97, 61:99, [180].

Aleurodiscus griseocanus (Pers.) Höhn. & Litsch.: on 2 Man [93, p. 75].

Botryosphaeria fuliginosa (Moug. & Nest.) Ell. & Ev.: on dead branches of 2 Man [93, p. 59].

B. obtusa (Schw.) Shoem. (*Physalospora o.* (Schw.) Cke.; stat. conid. *Sphaeropsis malorum* Berk. ex Pk., non Berk.): As a result of isolations from lesions on *Vitis*, Chamberlain et al. [181] reported the isolation of this fungus and *Phomopsis viticola* (Sacc.) Sacc. [*Fusicladium viticola*, q.v.] in equal proportions from lesions on trunks and stubs. However, *P. viticola*, but not *S. malorum*, was isolated from a few lesions on the current season shoots and foliage. The authors conclude that "*Sphaeropsis malorum*" may play an important role in the etiology of some phases of dead arm of grape. Shoemaker [996] examined four collections of their material on *Vitis* and found that two were *B. obtusa* and two were *B. stevensii* (q.v.).

B. stevensii Shoem. (*Physalospora mutila* (Fr.) N.E.Stevens, non *Botryosphaeria m.* (Schw.) Cke.): on *V. sp.* Ont [996].

Clathridium corticola (Fckl.) Shoem. & Müller (stat. conid. *Seimatopodium lichenicola* (Cda.) Shoem. & Müller): on 9 Ont [995].

Coniothyrium diplodiella (Speg.) Sacc.: white rot, pourriture blanche ou coitre: on 1 Ont 48:93.

C. Polivaceum Bon.: on twigs of 2 Man [93, p. 132].

Corticium filicinum Bourd. [*Xenasma f.* (Bourd.) Christiansen]: on old ? 2 Man [93, p. 76].

Didymella lophospora Sacc. & Speg.: on bark of 2 Man [93, p. 53].

Didymosphaeria diplospora (Cke.) Rehm.: on 2 Man [93, p. 54].

Elsinoë ampelina Shear (stat. conid. *Sphaceloma ampelinum* de Bary, *Gloeosporium ampelophagum* (Pass.) Sacc.): anthracnose, anthracnose: on *V. sp.* NS 45:99.

Fusicoccum viticola Reddick: dead arm, branche moribonde: on 1 Ont 24:27, 29:51; on 3 Ont 58:100. Dead arm is one of the important diseases of the grape in the Niagara Peninsula, particularly in the older vineyards. It causes annually much loss of bearing wood. There are two phases of the disease. Infection of the current season's growth may be reduced by timely sprays. Necrotic lesions on the trunk and arms frequently arise through pruning wounds. Care in pruning and the early removal of infected vines or parts of vines are advocated [179]. *Cryptosporella viticola* Shear, once reported to be the perfect state of the fungus, proved to be a secondary saprophyte. Goidanich [327] transferred the fungus to *Phomopsis*, but *P. viticola* (Reddick) Goid. is a later homonym of *P. viticola* (Sacc.) Sacc. (*Phoma viticola* Sacc.); the fungi may not be synonymous. The perfect state should be a *Diaporthe* or a related genus.

Guignardia bidwellii (Ell.) Viala & Ravaz (stat. conid. *Phyllosticta viticola* Berk. & Curt.) Thüm.): black rot, pourriture noire: on *V. sp.* Que, 1 Ont 24:27; on 1 BC 33:52, [50], Ont 47:97, NS 51:101; on 3 Ont 51:101; an unimportant disease except in poorly sprayed vineyards.

Haplosporella fabaeformis (Pass. & Thüm.) Petr. & Syd. (*Sphaeropsis vitigena* Ell. & Ev.): on twigs of 2 Man [93, p. 140].

Lophiostoma triseptatum Pk.: on 2 Man [93, p. 53].

Melanopsamma subfasciculata (Schw.) Ell. & Ev.: on old 2 Man [93, p. 51].

Monilinia fructicola (Wint.) Honey: brown rot, pourriture brune: on berries of 3 Ont 54:118.

Phialea scutula (Pers.) Gill.: on 2 Man [93, p. 41].

Phyllosticta spermoides Pk.: on 2 Man [93, p. 136], Man Ont 44:95.

Plasmopara viticola (Berk. & Curt.) Berl. & de Toni: downy mildew, mildiou: on 1 BC 28:45, Man [93, p. 31], Ont Que 24:27, 33:125, NS 38:82, [1138]; on 1, 4, 5, 6, 7, 8, 9 Ont 43:118; on 2 Man Que 44:95, Ont 43:92; on 3 Ont 53:101. The disease is occasionally severe Ont 40:77.

Uncinula necator (Schw.) Burr.: powdery mildew, blanc: on 1 BC 33:52, 41:72, [50, 535], Ont 24:27, Que 27:44, 48:93, NS 29:51, 55:113, [1138]; on 3 BC 62:84, Ont 56:114.

Iron deficiency, carence de fer: chlorosis, chlorose: on 1 Alta 44:96, Ont 25:32, 30:68.

Magnesium deficiency, carence de magnésie: interveinal chlorosis, chlorose internervale: on 1 Ont 25:32, 53:102.

Manganese deficiency, carence de manganèse: yellowing, jaunissure: on 1 Ont 49:90, 53:102, 57:111.

Potassium deficiency, carence de potasse: leaf scorch, pyrolose: on 1 Ont 37:58, 54:118.

Chemical injury: from 2,4-D: on *V. spp.* Ont 48:92, 53:102, 57:111, Que 50:100, NS 46:74, PEI 51:102.

Waldsteinia Willd.

ROSACEAE

Low perennial herbs of the north temperate regions.

1. *W. fragarioides* (Michx.) Tratt., barren strawberry; in Canada in NB, Que and Ont.

Puccinia waldsteiniae Curt.: III on 1 Ont [15, p. 240; 828].

Ustacystis waldsteiniae (Pk.) Zundel: on 1 Ont DAOM 6850, Que DAOM 546, [cf. 292].

Wistaria Nutt.

LEGUMINOSAE

Twining shrubs of N. America and e. Asia.

Phyllosticta wistariae Sacc.: leaf spot, tache foliaire: on *W. sp.* Que 31:103.

Woodsia R.Br.

POLYPODIACEAE

Low and small tufted ferns of temperate and cold regions.

1. *W. glabella* R.Br.; Alaska and arctic Canada south to Nfld, Que and Ont.

2. *W. ilvensis* (L.) R.Br.; Greenl, Nfld and NS to arctic Canada and Alaska; also in Eurasia.

Pleospora herbarum (Fr.) Rabh.: on 2 Greenl [900].

P. tragacanthae Rabh.: on 1 Frank [52].

Woodwardia J.E.Sm. POLYPODIACEAE

Large ferns of temperate and tropical regions of the northern hemisphere.

1. *W. virginica* (L.) J.E.Sm.; in Canada in NS, NB, Que and Ont.

Uredinopsis arthuri Faull (*U. struthiopteridis* sensu lat.): II¹ II² III on *I* Que 32:110, [289, p. 101], NS, as *U. mirabilis* (Pk.) Magn. [1138; cf. 15, p. 4].

Xanthium L. COMPOSITAE

Coarse annual weeds of warm and temperate regions.

1. *X. chinense* Mill.; in Canada in Que and Ont.
2. *X. echinatum* Murr.; PEI and NS.
3. *X. italicum* Mor. (*X. commune* Britt.); Que and Ont to Man and Sask.
4. *X. strumarium* L., cocklebur, gratin; adventive from Europe in Que to BC.

Puccinia xanthii Schw.: III on *X. sp.* Man 34:112; on *X. sp.*, 3 Man [93, p. 72]; on *I* Ont [15, p. 190]; on *I*, 2, 3, 4 Ont [828]; on 3 Que 32:110. Telia collected in Man were used to infect 3; sporidia give rise spontaneously to binucleate infections and only telia develop [138].

Septoria xanthii Desm.: on *X. sp.*, 3 Man [93, p. 140].

Yucca L. AGAVACEAE

Bayonet-leaved plants of Mexico and to a limited extent in the West Indies and e. US; a few commonly cult.

1. *Y. smalliana* Fern. (*Y. filamentosa* auct.); NC to Fla and Miss, but hardy and cult. further north.

Coniothyrium concentricum (Desm.) Sacc.: leaf spot, tache zonale: on ?1 BC Ont NS 46:89, Ont 50:133, NS 33:75, 125, [1138].

Phomatospora argyrostigma (Berk.) Sacc.: on leaves of *Y. sp.* BC [50].

Zantedeschia Spreng. ARACEAE

Perennial rhizomatous herbs of s. Africa; one is commonly cult. for its showy flowers.

1. *Z. aethiopica* Spreng., calla lily, pied de veau ou richardia d'Afrique.

Botrytis cinerea Pers.: on *Z. sp.* Alaska [175].

Erwinia aroideae (Townsend) Holland and *E. carotovora* (L.R.Jones) Holland: bacterial soft rot, pourriture molle: on *Z. sp.*, probably *I* BC 37:73, Ont 32:87, 38:110.

Zea L. GRAMINEAE

Coarse annual grasses considered to be of a single origin, cult. from prehistoric times by native peoples in N. and S. America.

1. *Z. mays* L., maize, Indian corn or field corn, blé d'Inde ou maïs fourrager. 1a, *Z. m.* var. *rugosa* Bonst., sweet corn, maïs sucré.

Bacterium stewartii E.F.Sm.: bacterial wilt, flétrissure bactérienne: on *I* Ont 32:52; on 1a Alta 62:68, Ont 32:52, 33:35, 53:80. Although the disease is common further south in the US, it has only rarely penetrated into s. Ont. The systematic position of this species is still in doubt [cf. 269a, 1052a].

Bipolaris sorokiniana (Sacc. in Sorok.) Shoem. (*Helminthosporium sativum* Pamm., King & Bakke): on *I* Man [1034].

B. turcica (Pass.) Shoem. (*Helminthosporium t.* Pass.): leaf spot, tache foliaire: on *I* Ont 50:33; on 1a Ont 62:68; the disease seems to be increasing in severity, 62:43.

Diplodia maydis (Berk.) Sacc. (*D. zeae* Lév.): dry rot, pourriture sèche: on *I* Sask 31:28, Sask Man [93, p. 133], Sask Ont [1034], NS [1138]; on 1a Que 47:74. The organism is of no practical importance in basal stalk rot of *I* in s.w. Ont [708], although it was recorded in hybrid corn plots at Harrow, 49:25. Of the organisms that cause ear rot, *D. maydis* is frequently recorded on hybrid corn in s.w. Ont, 41:19, 50:33, 52:30, but it is less important than *Fusarium moniliforme* (q.v.). It was particularly noticeable after injury by the corn earworm, *Heliothis zea* (Boddie), and the European corn borer, *Pyrausta nubilalis* (Hübner), Ont 43:20.

Epicoccum neglectum Desm.: on 1a NS 33:336, 34:112, [1138].

Erwinia dissolvens (Rosen) Burkh.: bacterial stalk rot, pourriture bactérienne: on *I* Ont 32:28; on 1a BC 52:72, Alta 31:28, 32:28, 44:73, Sask 34:22, Ont 42:64, 49:25. Occasionally present during hot humid weather in early July in s.w. Ont, but of no economic importance [708].

Fungi from seed of *I*: *Acremoniella atra* (Cda.) Sacc., Ont; *Alternaria consortialis* (Thüm.) Groves & Hughes, BC; *A. tenuis* auct. sensu Wiltshire, *Aureobasidium pullulans* (de Bary) Arn., *Aspergillus clavatus* Desm., Ont; *Bipolaris zeicola* (Stout) Shoem. (*Helminthosporium carbonum* Ullstrup), Ont Minn; *B. setariae* (Saw.) Shoem., *B. sorokiniana* (Sacc. in Sorok.) Shoem., Ont; *Cephalosporium acremonium* Cda., BC Ont; *Chaetomium cochliodes* Pall., Ont; *C. funicola* Cke., BC Ont; *C. globosum* Kze., Ont; *C. reflexum* Skolko & Groves, Alta; *Cladosporium cladosporioides* (Fres.) De Vries, BC Ont; *C. herbarum* Lk., *C. malorum* Ruehle, BC; *Cunninghamiella elegans* Lendner, Man; *Curvularia inaequalis* (Shear) Boed., *Diplodia maydis* (Berk.) Sacc., Ont; *Epicoccum nigrum* Lk., BC [374]. *Fusarium acuminatum* Ell. & Ev., Man; *F. moniliforme* Sheldon, Ont NY; *F. oxysporum* Schlecht., Man Ont; *F. poae* (Pk.) Wr., Man Ont Colo [334, 374]. *Melanospora papillata* Hotson, *Microascus variabilis* Massee & Salm., Ont; *Mucor javanicus* Wehmer, *M. racemosus* Fres., Ont; *Nigrospora oryzae* (Berk. & Br.) Petch, Man Ont USSR; *N. sphaerica* (Sacc.) Mason, *Paeccilomyces varioti* Bain., *Papularia sphaerosperma* (Pers.) Höhn., *Patella abundans* (Karst.) Seav., Ont; *Rhizopus oryzae* Went & Prins.—Geerlings, Man; *R. tamaris* Saito, Ont; *Rosellinia limoniiformis* Ell. & Ev., Man

[374]. *Sordaria humana* (Fckl.) Wint. Ont [159, 374]; *Trichoderma viride* Pers., Ont [374].

Fusarium spp.: root, stalk and ear rot, pourriture fusarienne: on *I* Ont 56:43, 59:38, PEI 26:9, 30:33. The following species were isolated from diseased stalks and roots, rotted cobs and/or from sporodochia on overwintered stalks of *I*: *F. acuminatum* Ell. & Ev., *F. avenaceum* (Fr.) Sacc., Man; *F. culmorum* (W.G.Sm.) Sacc., *F. equiseti* (Cda.) Sacc., *F. moniliforme* Sheldon, Man Ont; *F. m.* var. *subglutinans* Wr. & Rg., Ont; *F. oxysporum* Schlecht., Man Ont; *F. o.* var. *redolens* (Wr.) Gordon, *F. poae* (Pk.) Wr., *F. solani* (Mart.) App. & Wr., Man [335].

F. acuminatum Ell. & Ev.: on old stalk of *I* Man [93, p. 118].

F. culmorum (W.G.Sm.) Sacc.: affected ears of *la* BC 59:63.

F. moniliforme Sheldon: of the ear-rot pathogens on *I*, *F. moniliforme* appeared to be the most important in s.w. Ont 44:24, 50:33, 51:27, 52:30, 56:43, 59:38; in BC 41:19, Man 39:29; on *la* Que 45:78, PEI 44:73; along with *Pythium graminicola* (q.v.) commonly present in the necrotic part of the corn stalk [708].

Gibberella zeae (Schw.) Petch (*G. saubinetii* auct.; stat. conid. *Fusarium graminearum* Schwabe): of less importance than *F. moniliforme* (q.v.) as an ear-rot pathogen in s.w. Ont 41:19, 43:20, 44:24 et seq. It was also reported as the cause of root and stalk rot of *I* in Ont 49:25, 52:30, but it is of no practical importance [708]. *F. graminearum* was isolated from the perithecia on overwintered stalks Man 49:25, [93, p. 46; 335].

Lagena radiculicola Vanterpool & Ledingham: on *I* Sask [93, p. 29], Sask Ont [1034]; see *Triticum*.

Monascus purpureus West.: on silage of *I* Man [93, p. 34].

Mycosphaerella tassiana (de Not.) Johans.: on *I* BC [50].

Nigrospora oryzae (Berk. & Br.) Petch: on *I* Man [1034].

N. sphaerica (Sacc.) Mason: ear rot, pourriture noire: a minor cause of ear rot of *I* in s.w. Ont 41:19, 44:24; also on ears in Man [93, p. 122]; it rarely causes a stalk rot of corn Ont 41:20; [cf. 1034].

Olpidium brassicae (Wor.) Dang. (*Asterocystis radialis* Willd.): on *I* Sask 31:28, [1034].

Phialophora radiculicola Cain: root rot, pourriture des racines: on roots of *I* Ont 51:27, [157, p. 340]. W.E.McKeen [707] found that the fungus caused a root rot of *I*; he described the vegetative appearance and the histopathology of the parasite.

Pratylenchus pratensis (de Man) Filip.: meadow nematode, nématode des prés: found in roots of *I* in s.w. Ont, but its importance is unknown.

Pseudomonas syringae van Hall (*Bacillus sorghi* Burr.): bacterial leaf spot, tache bactérienne: on *I* Sask Man 24:17, Sask 53:49, Man 51:26.

Puccinia sorghi Schw.: rust, rouille: II III on *I* Sask 32:28, Sask Man [93, p. 71], Man 21:16, Ont Que 25:19, NB PEI 26:9, NB PEI [1138], NS 50:33; on *la* Sask Ont NS 38:56, Man 35:39, Que PEI 33:26; infections rarely exceed a trace, but in 1950 rust was epidemic in s. Ont on both *I* and *la* 50:33, 84.

Pythium, *Bipolaris* (*Helminthosporium*) and *Fusarium* spp.: root rot, piétin: *P. graminicola* Subram. (*P. arrhenomanes* Drechsl.), *P. debaryanum* Hesse, *B. bicolor* (Mitra) Shoem., *B. maydis* (Nisikado & Miyake) Shoem., and *F.* spp. were isolated from

diseased roots of *I*. Of these organisms, in artificially inoculated soil, *Pythium* spp. were the most pathogenic, *Bipolaris* spp. were less so, and *Fusarium* spp. the least. A preceding crop of soybeans reduced the incidence of root rot whereas timothy increased its severity. The stand was reduced by preemergence killing of the seedlings and the surviving plants were dwarfed by the destruction of the roots [879].

P. debaryanum Hesse: on *I* Ont [1034].

P. graminicola Subram. (*P. arrhenomanes* Drechsl.): root and stalk rot, piétin pythien: on *I* Sask [93, p. 31], Sask Man Ont [1034], Man 40:23, Ont 50:33, 55:48; the pathogen is of major importance as a stalk rot, although it gains entrance through the roots [708].

P. ultimum Trow: isolated from *I*, but probably only slightly pathogenic to corn Sask 41:20.

P. volutum Vanterpool & Truscott: an isolate from *Triticum aestivum* in Sask was pathogenic to the roots of *I* [93, p. 31].

Ustilago maydis (DC.) Cda. (*U. zeae* (Beckm.) Ung.): smut, charbon: on *I* BC 28:29, 31:27, Alta 30:32, Sask-NB 24:16, NB PEI [1138], NS 32:28, PEI 26:9; on *la* Alta Que NS 32:52, Sask 34:46, Man 38:56, Ont NB 33:36. The level of infection varies greatly from year to year and occasionally may be heavy Man 38:56, Ont 49:26, 54:51.

Magnesium deficiency, carence de magnésie: on *la* Que 53:80, NS 52:72.

Nitrogen deficiency, carence d'azote: on *la* PEI 44:73.

Phosphorus deficiency, carence de phosphore: on *la* NS 53:81, PEI 46:57.

Zinnia L.

COMPOSITAE

Annual or perennial herbs or subshrubs of N. and S. America; cult. for their showy flowers.

1. *Z. elegans* Jacq.; Mexico; widely cult.

2. *Z. linearis* Benth.; Mexico.

Alternaria zinniae Pape: alternaria blight, brûlure alternarienne: on *I* BC 44:119, 48:115, [535], Ont 53:124, 61:117, Que 55:127, NB 60:69, NS 52:121.

Botrytis cinerea Pers.: gray mold, moisissure grise: on *I* Alaska [175], BC [535], Ont 57:130, Que 51:120, 56:132, NS 55:128, PEI 36:86, 38:110, 50:133.

Choanephora sp.: associated with a blossom blight of *Z.* sp. Que 49:112.

Erysiphe cichoracearum DC. ex Mérat: powdery mildew, blanc: on *Z.* sp. BC Ont 36:86, BC [50], Ont 31:103, 34:93; on *I* Man [93, p. 44].

Fusarium spp.: wilt, flétrissure fusarienne: on *Z.* sp. BC 29:72, 39:110, Ont 34:93, Que 36:86; the disease appeared to be destructive for several years at Summerland, BC. *F. oxysporum* Schlecht. and *F. o.* var. *redolens* (Wr.) Gordon were isolated from basal parts of *2* affected by foot rot in Man 39:100, [335] and *F. solani* (Mart.) App. & Wr. from basal parts of wilted *I* BC 36:86, [335].

Meloidogyne hapla Chitwood: root-knot nematode, nodosité des racines: on *Z.* sp. Ont 61:118.

Phytophthora cryptogea Pethbr. & Laff. or *P.* sp.: foot rot, mildiou du pied: on *I* BC 54:138, [535], Ont 61:118.

Sclerotinia sclerotiorum (Lib.) de Bary: stem rot, pourriture sclérotique: on *Z.* sp. BC 34:93, Sask 58:121, Man 32:97, 44:119, Que 38:110, 40:99, NB 26:37.

Zinnia

Aster yellows virus: aster yellows, jaunisse de l'aster: on *Z. sp.* Sask 37:85, Ont 49:112, NB 30:86, 33:75, 44:119, PEI 32:88; on *I BC* 47:116.

Other virus diseases reported are: curly top, frisolée de la betterave, NB 42:107; leaf mottle, marbrure, NB 39:110; and mosaic, mosaïque, Que 51:120.

Zizania L.

GRAMINEAE

Tall aquatic grasses of e. N. America and e. Asia.

1. *Z. aquatica* L., wild rice, riz sauvage; Que and Ont. 1a, *Z. a. var. angustifolia* Hitchc. (*Z. palustris* L.); NS and NB to Ont. 1b, *Z. a. var. interior* Fassett, Man and n. central US.

Claviceps zizaniae (Fyles) Pantidou (*C. purpurea* auct.): ergot, ergot: on *Z. sp.* Ont [319]; on *I* Man Ont NB NS 38:25, [1034], NB 31:126; on *1a* NB [1034]; the perfect state was developed from sclerotia on *1b* NB [819, p. 1234], [cf. 320, p. 17].

Drechslera catenaria (Drechs.) Ito: on *I* Ont [993].

Entyloma lineatum (Cke.) Davis: on *I* Ont DAOM 42954; on *1a* Ont DAOM 26519, NS DAOM 15238; on *1b* Man DAOM 84798; [cf. 292].

E. peninsulae Crowell: reported on *I* NS [230, p. 328], but a reexamination of the type revealed the fungus to be *Ustilago longissima* on *Glyceria* (q.v.), fide [292, p. 276].

Erysiphe graminis DC. ex Mérat: on *I* Man Ont NB NS [1034].

Zizia Koch

UMBELLIFERAE

Smooth perennial herbs of N. America.

1. *Z. aptera* (Gray) Fern. (*Z. cordata* sensu Koch), alexanders; Que and Ont to Alta and BC.
2. *Z. aurea* (L.) Koch; NB and Que to Man and Sask.

Ascochyta thaspii Ell. & Ev.: on leaves of ?2 Man [93, p. 132].

Cercospora ziziae Ell. & Ev.: on *I* Man [93, p. 115].

Puccinia angelicae (Schum.) Fckl.: 0 I II III on 2 Man [15, p. 319; 93, p. 65], Que DAOM 19926.

P. ziziae Ell. & Ev.: III on *I* Sask [15, p. 320; 93, p. 72].

Zostera L.

ZOSTERACEAE

Grasslike marine herbs of the cooler parts of the northern and southern hemispheres.

1. *Z. marina* L., eelgrass, herbe à bernaches; Greenl, Labr, and NB, Keew, Yukon, Alaska and BC.

Labrinthula macrocystis Cienkowski: on *I BC* [1191].

Lulworthia halima (Diehl & Mounce) Cribb & Cribb (*Ophiobolus halimus* Diehl & Mounce): collected on rhizomes and fertile shoots and developed on leaves of *I* near St. Andrews, NB, 34:112, [743, p. 245].

Zygadenus Michx.

LILIACEAE

Smooth perennial plants of N. America and Asia.

1. *Z. elegans* Pursh (*Z. chloranthus* auct. p.p.), white camass; Man, Mack and Yukon to Alaska, Alta and Ore.
2. *Z. glaucus* Nutt. (*Z. chloranthus* auct. p.p.); NB and Que to Ont.
3. *Z. gramineus* Rydb.; Alta and Sask.
4. *Z. venenosus* S. Wats., poison camass; BC to Idaho and Calif.

Mycosphaerella tassiana (de Not.) Johans.: on *I BC* [50].

Puccinia atropuncta Pk. & Clint.: II III on *I* Sask, 2 Ont [15, p. 220]; on *I* Sask [93, p. 66]; on 2 Ont [828], Que 34:112, [8, 963].

P. grumosa Syd. & Holw.: 0 I II III on *I* Alaska [175], BC [15, p. 221; 963].

Uromyces zygadeni Pk.: 0 I II III on 3 Alta 24:61, [15, p. 221; 93, p. 73]; on 4 BC [963].

Zygocactus Schum.

CACTACEAE

Flat-stemmed short-jointed cacti of Brazil; cult. for their showy flowers.

1. *Z. truncatus* Schum.

?*Agrobacterium tumefaciens* (Sm. & Towns.) Conn: crown gall, tumeur du collet: galls observed on probably *I* but reported as *Schlumbergera russelliana* (Hook.) Britt. & Rose, Sask 53:123.

ADDENDA

To p. 35 under *Angelica*:

Sclerotinia sclerotiorum (Lib.) de Bary (*S. libertiana* Fckl.): on *I* Greenl [900].

Sclerotium oxriae Rostr.: on *I* Greenl [900].

S. rufum Rostr.: on *I* Greenl [899, p. 579].

Septoria dearnessii Ell. & Ev.: on ?*A. sp.* Alaska [175].

To p. 56 under *Betula*:

D[aedalea] unicolor Bull. ex Fr.: white spongy rot, carie blanche spongieuse: causes a rot of broad-leaved, or rarely, of coniferous trees; on *B. sp.* Yukon; [1207]; on *B. spp.* NB NS PEI [1138]; on *I* Greenl [900]; from decayed sapwood of living 5, common, Alaska [555]; on 5 BC [1207], Sask [93, p. 81]; from 5 Que [175]; studied in culture by Nobles [791]; see *Acer*.

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INDEX OF PLANT PATHOGENS AND OTHER CAUSAL AGENTS

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